

33rd
YEAR

CHEMICAL WEEKLY

VOL. XXXIII

JANUARY 5, 1988

NO.

Chemox Chemox Chemox Chemox

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METHANOL

ACETONE

CAUSTIC FLAKES & LYE

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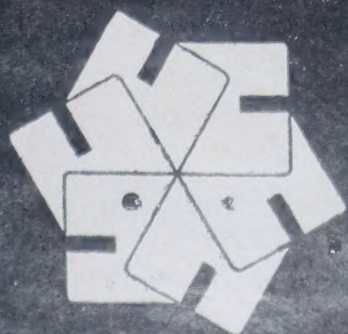
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& ITS SALTS**

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chemphos

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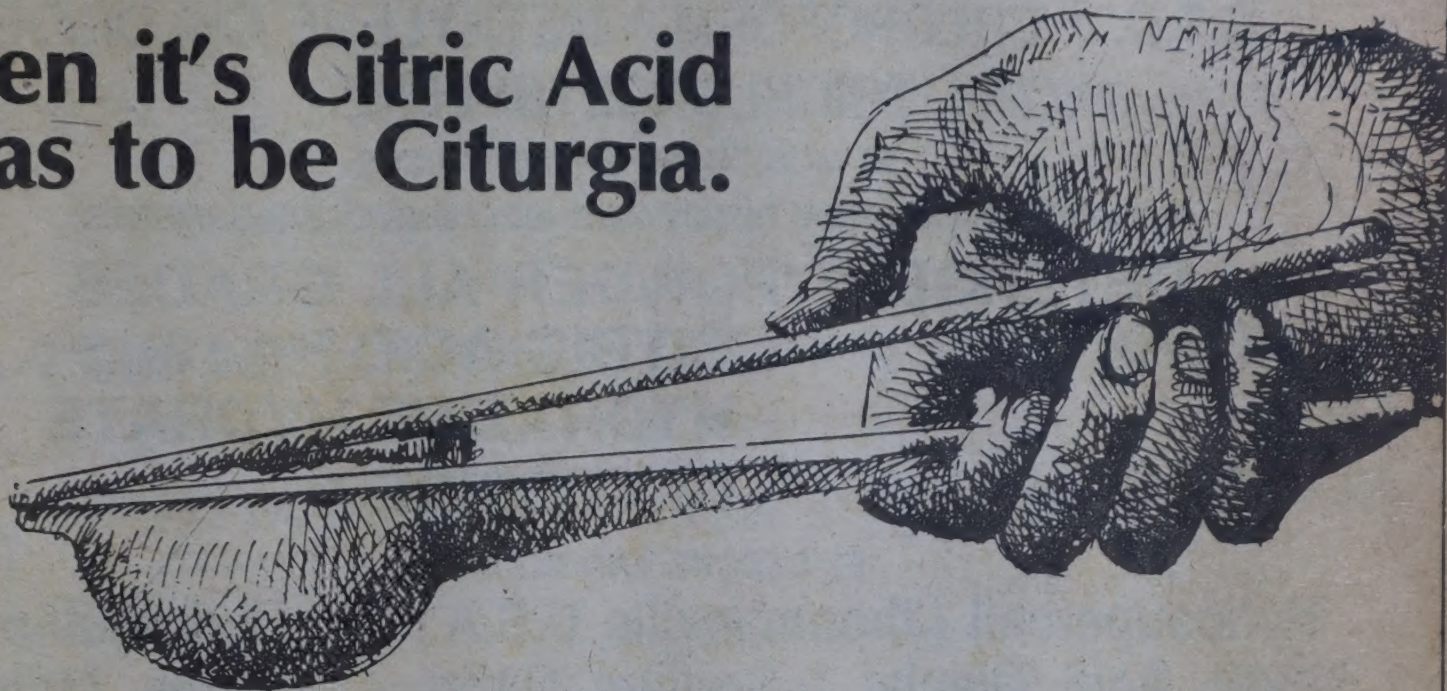
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Gram: SCENTOUS, Telephone: 64551
- MADRAS** : Syndet Enterprises, 90, Govindappa Naick Street, Madras-600 001.
Gram: SCENTOUS, Telephone: 35532
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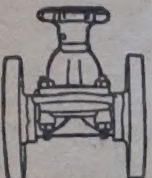
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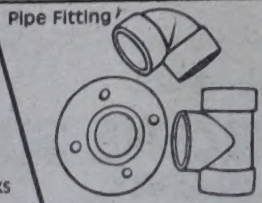
Manufacturers

Silvassa Syndet Private Limited

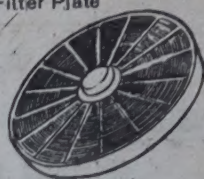
Amli Industrial Estate,
SILVASSA - 396 230 -- Via Vapi,
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(Phone: 280)



Diaphragm Valve



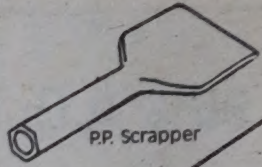
Pipe Fitting



PP Filter Plate



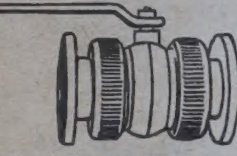
P.P. Cocks



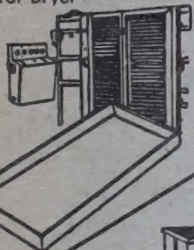
P.P. Scraper



Pall Rings



Ball Valve



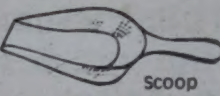
Trays for Dryer



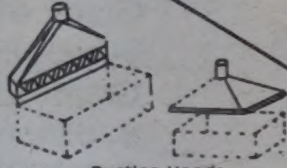
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Tank



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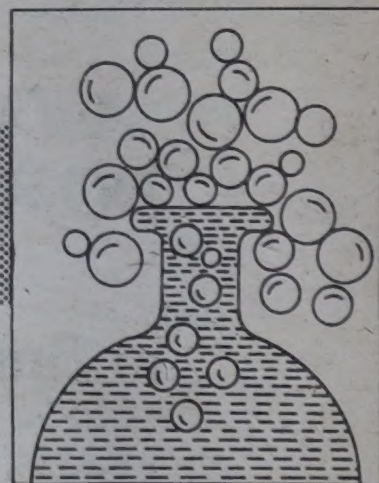


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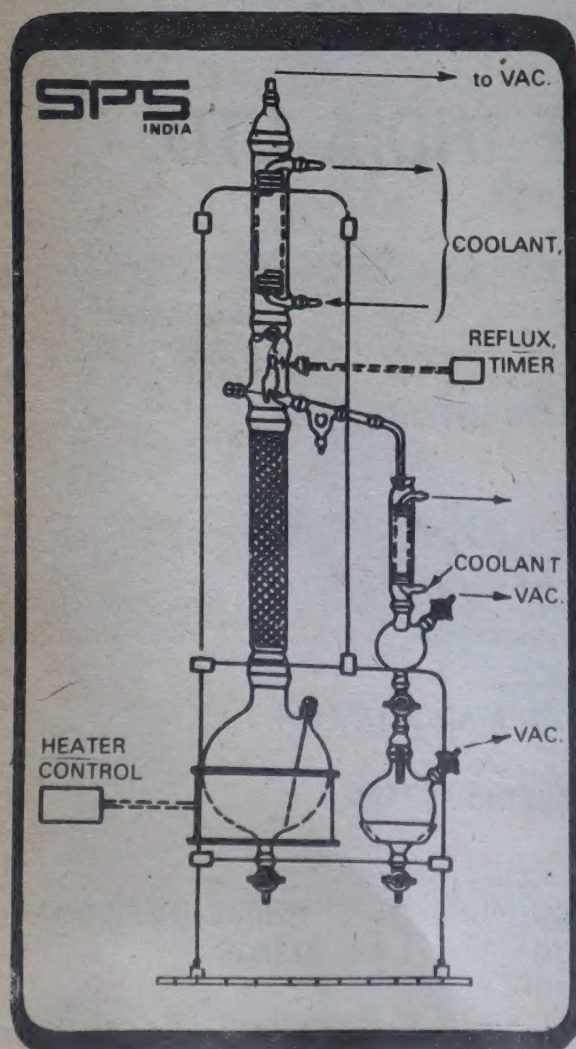
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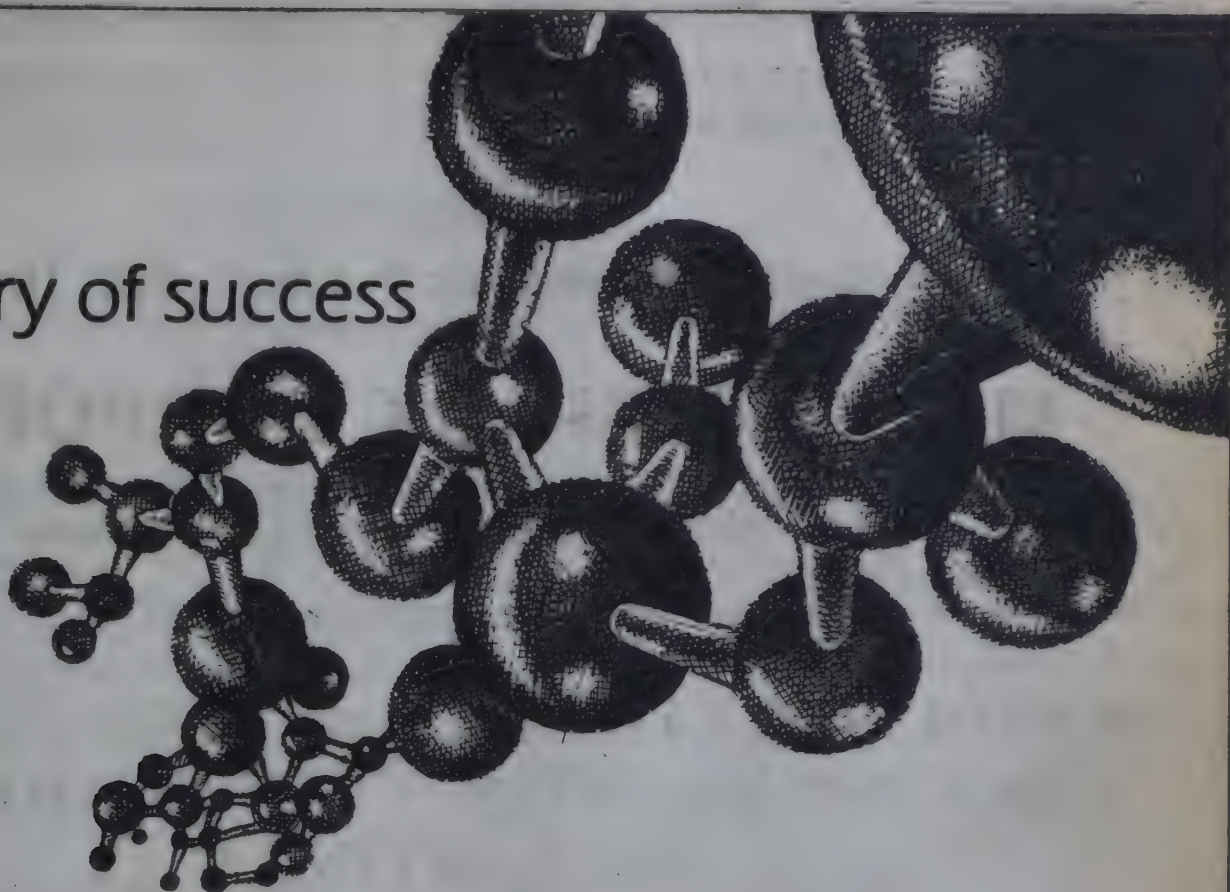
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The Outlook for Rubber

Rubber industry in India is regarded as a strategic one falling under the core sector of the national economy. This industry plays a notable role in meeting the requirements of important sectors like agriculture, transport, ordinance factories and space research. The Indian Rubber Board claims the distinction of having raised rubber production fifteen fold during the past four decades. India ranks fifth among the natural rubber producers in the world and ninth among the manufacturers of rubber goods. The per capita consumption is only 0.44 kg. against 10 kg. in developed countries. The production of natural rubber during 1986-87 reached an all time high figure of 2,19,520 tonnes -- an increase of 9.5% over the previous year -- while the consumption of natural rubber rose to 2,57,305 tonnes -- again an increase of 9.5% over the previous year. The production prospects for 1987-88 are regarded as bleak in view of the adverse weather conditions; however consumption levels are expected to be maintained.

During 1986-87, the import of rubber rose to 45,000 tonnes. India has been a continuous importer of natural rubber for the past three and a half decades. The average imports for the last 6 years works out to 34,000 tonnes per year. The total area under cultivation has increased from 0.69 lakh hectares in 1950-51 to 3.62 lakh hectares in 1985-86. The average yield per hectare has increased from 284 kgs. in 1950-51 to 898 kgs. For the first time in the history of the Industry the yield figures compare favourably with the advanced countries like Malaysia and Phillipines and are noticeably higher than those of Indonesia, Sri Lanka and China.

Natural rubber plantations have a life span of about 30 years; which may be divided into three different periods on the basis of their productivity (i) A period of 8 years when the production gradually increases from low levels (ii) a period of 12 years when the production continues at peak levels and (iii) a period of ten years when production gradually declines back to low levels. In other words a plantation culture capable of yielding 2000 kgs. per hectare during the high production period of 12 years, may ultimately end up with an average of 800-900 kgs. only for the total life span of 30 years. A publication of the Rubber Board in 1971-72 claimed the evolution of a new variety of high yielding budding RR II 105

with an estimated yield of 1364, 1664, 2510, 3113, 3806 and 4067 kg. per hectare from the first to 7th year of plantation. According to the Malaysian Rubber Statistics handbook (1984-85) the overall average yield exclusively of high yielding budded and clonal rubber in estates with holdings varying between 40 to 2000 hectares covering a total area of 387,614 ha worked out to 1477 kg/ha.

Kerala is the leading rubber producing state in the country accounting for more than four-fifth of the annual natural rubber production. It is the small holdings that dominate the rubber production scene in India; 77% of the area under rubber cultivation are held by 2,30,000 holders with the miserable acreage of 0.97 hectares each. This sector contributes to 71% of the total natural rubber production. The remaining area with large holding are held by estate owners. The combined average of 12 estates in Kerala of the larger rubber plantations worked out to 1447 kg/ha for a total area of 7778 ha.

Achievement of higher productivity under Indian conditions depends on the successful launching of a crash programme to increase the productivity of the small growers even by as little as 150 kg/ha. If the many thousands of small growers really make an effort India today can raise an additional 40,000 tonnes thereby completely offsetting the need for costly imports.

According to a published Malaysian survey, the yield per tapper per day in the estate sector with an average yield varying between 1380 - 1450 kg./ha. was around 17 to 19 kg. In India, at the Rubber Board's experimental station with an average yield of 1541 kg/ha. in an estate covering 110 ha. the rate was around 9 kg/day. Thus another area for enhanced productivity under Indian condition lies in improved training facilities for tappers; after all ethnically, the Malaysian tapping record has been achieved most probably by a tapper of Indian origin. The Rubber Board has embarked on an ambitious scheme aimed at doubling the production of natural rubber by the turn of the century in order to cope up with the ever-increasing internal consumption. The Rubber Board had estimated that requirements of natural rubber was

expected to touch 5,00,000 tonnes by the year 2000 from the present production of about 2,20,000 tonnes.

Multi-pronged schemes that have been evolved to meet the requirements include bringing in additional areas under rubber plantation, popularisation of high-yielding clones like RR11 105 and a vigorous campaign to persuade small-growers to go in for replanting at the earliest. The area under rubber plantation is expected to be enlarged to 4,75,000 ha. by 1995, giving another 7 years for the plants to start yielding, apart from the present 2,50,000 ha. of yielding plantations and the 1,34,000 ha. already under immature plantations.

The Rubber Board Chairman has emphasised the need to bring in non-traditional regions in Tripura, Assam, Meghalaya, Mizoram, Orissa, Goa, Southern Maharashtra and Karnataka under rubber plantations to meet the growing requirements. The expectation was that about 11,000 ha. would be added annually under rubber plantation, including 4,000 under non-traditional belt, to achieve the goal. The average production was expected to touch 1,250-1,300 kg./ha. by the year 2000.

To bring 4,75,000 ha. of land under new plantation and replantation between now and 2000 AD a financial outlay of about Rs. 900 crores will be called for on the basis of current day costs. The required outlay may even cross Rs. 1,200 crores, at the current rates of inflation. The average yearly outlay provided in the 6th plan was only Rs. 64 crores/year and that for the 7th plan Rs. 104 crores per year.

On a worldwide basis synthetic rubber consumption ratio to natural rubber consumption is of the order of 70:30; in India synthetic rubber accounts for less than 15% of the total rubber consumption. One reason being advanced for this haphazard development is that in India the emphasis is more on heavy duty tyres where natural rubber is the preferred polymer. However there is an imperative need to examine the basis of these consumption ratios in line with the recent trends in auto tyre production.

Even in other rubber producing countries like Brazil and China the rubber usage pattern does not differ so widely to the world pattern as in India. It is clear that indigenous production of natural rubber cannot keep pace with the growing consumption. All the world over SBR is the most widely used type of synthetic rubber and its production can be stepped up in India to replace imports of all types of general purpose rubber, since SBR and natural rubber are interchangeable for most purposes. All over the world SBR is the cheapest general purpose rubber but in India it tends to be the most expensive because the main raw materials for its production, such as butadiene, alcohol and other chemicals are heavily taxed. As against this there is virtually

no tax on natural rubber and light taxation on PBR (Polybutadiene rubber) manufactured by IPCL.

Realising that SBR holds the key to India's rubber self-sufficiency, the Central Government have recently modified their policy of encouraging higher production of SBR through butadiene imports side by side with the grant of license for the expansion of indigenous production capacity. Reclaimed rubber is obtained by regeneration of rubber from discarded tyres and tubes and other waste rubber products. There are several grades of reclaimed rubber manufactured to meet specific end-uses. Though the quality of this product is acceptable to the market for use in cycle rickshaw and auto tyre battery boxes and other moulded products, further R & D efforts are required to make full use of discarded rubber products and make reclaimed rubber usable for all purposes.

Reclaimed rubber accounts for 11 to 12% of the total rubber consumption. There are at present 26 units engaged in reclaiming of rubber with an annual installed capacity of 94,000 tonnes but 6 units are reported to be closed down. The available installed capacity may not be fully utilised even by the turn of the century, since the current plant utilisation capacity is below 35%. Of the total rubber consumption about 48% is consumed by the tyre sector and the balance by the non-tyre sector. There are about twenty large and medium sized tyre companies with a total capacity of 21 million tyres. Current capacity utilisation rate fluctuates between 50-60% and the present installed capacity is unlikely to be utilised fully even in the coming decade.

The range of products manufactured by the rubber goods industry comprises of all types of heavy duty tyres including those for earth moving equipment, footwear, transmission and conveyor belts, moulded and extruded goods. These also cover high tech items like pipe-seal, bridge bearings used for bridges and multi-storey buildings, rubber safety units for pilots in supersonic aircraft, floor tiles for use in high traffic airports, sports goods, family planning devices etc. Indian rubber products find their way to 85 countries including US, USSR, UK, Holland, France and Australia.

An adverse consequence of the rising costs of Indian rubber products has been the loss of their competitiveness in export markets with the current value of exports hovering around Rs. 100 to 115 crores per year.

Rubber and rubber products represent a crucial sector, which with proper planning, foresight and financial incentives can add to our economic growth and enhanced quality of life by way of increased national income, reduced imports and higher foreign exchange earnings from exports of value added products.

--T.P.S. RAJ

CHEMARENA

S.L. VENKITESWARAN

"Agent Orange" and Ex-Servicemen of USA

"Agent Orange", the 2,4-D and trichlorophenoxy acetic acid (2,4,5-T) mixture, continues to be in the news. This was the devastating defoliant chemical which was sprayed by US army over large tracts of forest land during the Vietnam War to reduce the cover provided for the guerilla attacks against the US Army. Large areas of land with vegetation destroyed have been slowly getting back to life and the loss to Vietnam has been of enormous magnitude. Compensation was talked about at the time of the peace negotiations but nothing much seems to have come out of it. There is little information on the present status of the land and the way the problems have been tackled.

But the news on Agent Orange has been on the effects on the former army/air force personnel -- Vietnam "Veterans" who handled this destructive material. It was noted that the 2,4,5-T used contained the deadly dioxin -- TCDD or 2,3,7,8 tetrachloro dibenzo-p-dioxin -- which caused several diseases viz. chloracne, birth defects and cancer. The use of 2,4,5-T has been banned or severely restricted even when the level of TCDD has been brought down to ppm levels. But the Vietnam Veterans, who cared little for the devastation caused by Agent Orange in Vietnam, were greatly worried on the effects of Agent Orange on those who handled it.

A "class action" law suit was filed in 1979 on their behalf against the companies that had manufactured the product as per army specifications. This law-suit had gone on for some years with no tangible result. Whether you claim compensation from the manufacturers or from the Government which ordered them to handle it the primary issues are the levels of exposure to persons who specifically handled it and more important, the linkage between the exposure levels and specific health effects -- more or less like the MIC exposure and the effects on Bhopal gas victims. But several studies seem to indicate that there is hardly any linkage between exposure to Agent Orange and health problems subsequently encountered. A law was passed by US Congress for the Veterans Administration to conduct an epidemiological study. This study was later entrusted to the Centre for

Disease Control -- CDC. The Air Force also began a study of its own on a list of over a thousand persons.

The identification of persons who had exposure to Agent Orange, much less on the levels of exposure, have been difficult. But the levels of TCDD in human blood serum can be an indication. A method for determining extremely low levels of TCDD in blood serum was evolved. Even for this a 450 ml. blood sample was required but it avoided the method of taking out 20 gm of adipose tissue for the analysis. The first conclusion of an extended study was about very few of the "Veterans" had suffered significant TCDD exposure and this was received with howls of protest. Another study by the Administration showed that there was no evidence of any significant increase in deaths from non-Hodgkins lymphoma and lung cancer in those who had been exposed to Agent Orange as compared to others. A mortality study covered over 50,000 persons and no remarkable differences even in the major cause of death categories was noticed. There was no excess cancer rate except among the marines, with no relation to TCDD exposure.

But the US Administration is thorough in follow-up measures and on-going programmes of examination and treatment of those suspected of exposure and having health problems continue. Persons who suspect that health problems are related to Agent Orange are examined in detail. The only clear evidence is that of chloracne -- a skin ailment due to exposure to chlorinated compounds -- and TCDD, and those afflicted can get compensatory payments. Other studies continue on groups of Veterans but still show no clear case of increase in deaths attributable to cancer or any increase in a particular type of cancer. There is now even a claim that the body's immune system is affected, again with no clear evidence. One conclusion evident from the many studies is that the Agent Orange is not the cause of the health problems of the Veterans. The much maligned Agent Orange has not proved to be a villain except to the Vietnamese whose forests were defoliated and for whom there is no compensation.

Computers in Chemical Engineering

Computers have been taking over most of the work load and controls of operations and have, since a few years, taken over most of the engineering design work. The advances in chemical engineering have been spectacular after some early beginning in piping and heat exchanger designs. The specialist firms providing sophisticated software and the large chemical undertakings with their own internal departments of specialists have provided the momentum for growth. A review of the recent progress was provided in a special workshop of invited professors of selected universities organised jointly by the A.I.Ch. Eng., Dow Corning and Dow Chemicals at Midland Mich., in an effort to bridge the Academy-Industry interface. (*CE News*, 9.11.87). The conference also helped to appraise the professors on new materials such as the large varieties of special silicones and silicone membranes and high tech ceramics which add new dimensions to engineering designs. Silicone membranes of high permeability help large scale gas separation and controlled release applications.

Computers help in the quick calculation of thousands of data and optimise the detailed designs and flows for a process and avoids the usual rule of thumb methods in vogue. The other great advantage is that of networking in a centralised processing unit and shared data systems. Modelling and simulation is possible with the newly developed software systems. Engineering time spent in calculations is said to have been halved through computer systems with their built in data base.

One of the recent developments is a technique termed **Simusolv** of Dow Chemical. It is a multifunctional software package for modelling and analysis of the dynamic behaviour of various physical systems and was developed by Dow Chemical for their own use and enable their researchers and design engineers to avail of computer -- aided modelling techniques. **Simusolv** employs high level Advanced Continuous Simulation Language -- ACSL -- a differential equation solver and has been used for process engineering, toxicology, pharmacology, chemical kinetics, environmental sciences and agriculture. It is said to be very useful for modelling chemical reactors, batch or continuous. Dow is said

to have scaled up successfully the production process for an insecticide involving highly exothermal reaction. It has also been applied to risk assessment and cost benefit factors, ecosystem behaviour on spillage of particular chemicals etc. Dow Chemical is said to be prepared to offer the system to others.

Dow also is said to have developed a lab automatic system with data display, under the name Camile. 12 of these are said to be used through their factories and laboratories, and Camile system is said to be available in different versions and input-output channels. Its use is said to be helpful in studying heterogeneous catalytic reactions, toxicology chambers, continuous distillation units, multi-purpose reactors, CST reactors etc. and providing the optimal conditions.

In the field of high performance ceramics there are two basic types -- one for structural applications including combustion engine designs and another for electronic applications. High-tech ceramics are said to be a billion dollar business.

The new developments in composites add another new area in materials. The fibre optics advances have enabled engineers to see the inside of an operating pump, get at the distribution patterns of liquids and vapors surrounding the distillation column or separation towers for improving the internals. Heat exchangers are now optimised in design with least requirement of materials. "Laser Doppler Anemometry" or Doppler effect of laser beams have been used to determine forces acting on an impeller and effect improvements in mixing equipment. The variety of composites and alloy materials from plastics and fillers has enabled more exotic materials for pumps and valves and other ancillaries like bearings and housings for rotating equipment. One report mentions a computer aided design linked to a photoform output which brings out a three dimensional hard copy of the design.

We are already in an era of computer based design of most process equipment and hardware, and taking full advantage of the wide variety of new materials.

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KANDLA — BHATINDA PIPELINE PLAN

IOC asked to prepare feasibility report

The Public Investment Board (PIB) has "in principle" approved the Indian Oil Corporation (IOC) plan to lay a 1,370 km-long pipeline connecting Kandla port with Bhatinda in Punjab. PIB, which considered the pipeline proposal at its recent meeting has asked IOC to prepare a detailed feasibility report of the project and submit it for consideration.

The pipeline project, estimated to cost Rs. 604 crores is slated for completion within 48 months approval, according to IOC sources.

The official circles in New Delhi feel that the pipeline should be commissioned before the Karnal refinery becomes operative in 1993. The pipeline, originating from Kandla Port in Gujarat will reach Bhatinda via Rajasthan and Karnal in Haryana.

The proposed pipeline will be a boon to the north-west supply region of IOC which includes several revenue districts of Jammu and Kashmir, Punjab, Haryana, Himachal Pradesh, Delhi, Rajasthan, Gujarat, western Uttar Pradesh and western Madhya Pradesh.

The north-west supply region (also called Koyali-Kandla — Okha region by IOC) has emerged as the main consumer of petroleum products in the country. At present, it consumes about 34 per cent of the total consumption, put at 43 million tonnes in 1986-87.

Since the petroleum products' rate of growth of demand in the north-west region is higher, it is estimated that by 2005 A.D. it will be responsible for over 40 per cent of the total consumption. The consumption figure in the country is expected to touch 92 million tonnes in 2000 A.D. and 116 million tonnes in 2005 A.D.

A single buoy mooring has also been proposed at Salaya at a cost of about Rs. 83 crores. This will also be completed within four years of approval. These are part of the four major projects proposed by Indian Oil at a cost of Rs. 880.62 crores. The corporation has major plan projects on hand valued at Rs. 1316.60 crores. It has so far made fixed investments of Rs. 2271 crores. Of these 77.9 per cent

have been financed from internally generated resources.

Amongst the on-going schemes are expansion of the Gujarat and Mathura refineries by 2.2 million tonnes and 1.5 million tonnes per annum respectively. Both would help in meeting the galloping demand of petroleum products in the north-west.

The Gujarat refinery expansion would enable utilisation of the additional two million tonnes of north Gujarat crude. Since this crude is likely to yield considerable heavy ends, a hydrocracker is being installed for the first time in the country at a cost of Rs. 635 crores to augment distillate yield. A hydrocracker is also planned at Karnal refinery being set up as a joint venture between Indian Oil and Tata Chemicals.

Another 55 km-long product pipeline connecting Haldia with Budge in Calcutta is also under the consideration of the Government.

The Government has also approved setting up three grassroot refineries — in Assam, at Karnal (Haryana) and Mangalore (Karnataka) — adding up to eleven million tonnes.

The debottle-necking schemes at existing refineries would add another 4.6 million tonnes. More such schemes, including expansion of capacity would bring the total capacity to 67 million tonnes, still leaving a gap of 38 million tonnes.

The refinery expansion required an investment of about Rs. 9000 crores at Rs. 1500 crores for each refinery.

NEW IMPORT-EXPORT CODE NUMBER

The commerce ministry has decided to allot a new importer-exporter code (IEC) number to all those who are required to interact with the Import Trade Control Organisation regarding imports and exports. The new system will come into force from April 1, 1988.

The work relating to the allotment of new code numbers will be done by the regional licensing authorities with effect from January 1, 1988, so that it is completed before the new import-export policy comes into force from April 1, 1988.

Applications for allotment of IEC numbers should be submitted in a prescribed form to the concerned import trade control licensing authority, a press release issued on Dec. 29 by the Chief Controller of Imports and Exports (CCI and E) stated.

The allotment work relating to the new code numbers has been entrusted to regional licensing authorities to help importers and exporters, it was explained.

The introduction of IEC number is part of the overall process of computerisation in the office of CCI and E. It will integrate the various computerised systems in the CCI and E office.

Central and state ministries as well as government departments will be exempt from obtaining the new code numbers. Moreover, persons importing and exporting goods for their personal use, not connected with trade or manufacture of agriculture, will also be exempted from the new system.

The public notice issued on December 23 referred to para 47 of the handbook of import-export procedures (1985-88) in terms of which every person importing goods into India will require importers code numbers unless specifically exempted by the CCI and E. Similarly, in the case of an exporter, he was required to get an export code number from the Reserve Bank of India.

COPPER CHEAPER, LEAD, NICKEL TO COST MORE

The pricing committee on non-ferrous metals has reduced the selling price of copper with effect from Jan. 1st while revising the price of nickel and lead upwards.

The price of electrolytic copper wire bar and high grade cathodes have been reduced to Rs. 75,000 per tonne from 80,000 on account of reduction in import duty, an official announcement said in New Delhi.

Continuous cast copper wire rods will also cost Rs. 5,000 less at Rs. 83,000 per tonne.

The announcement has come as a new year gift to the copper consuming industry, as the uncertainty over the import duty cut had lent volatility to the domestic copper market with prices showing wild fluctuations to the tune of Rs. 6,000 to Rs. 7,000 per tonne. (See also pgs. 42, 52 etc.)



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Dr. O. P. KHARBANDA

Frankly Speaking

Safety in the Chemical Industry

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BHOPAL has been a grim reminder to the world that safety cannot be taken for granted. It has to be built in right in the beginning at the design stage and has constantly to be worked for at all the subsequent stages including construction, commissioning but particularly during operation as also maintenance. Dangers lurk around the corner at every stage in the chemical industry and a deliberate and conscious effort needs to be maintained in all operations, even storage is not immune. And the good old Murphy law must never be ignored:

If something can go wrong, it will.

The law has been proved time and again, and we would be well advised to accept this as the gospel truth, for 'forewarned is being forearmed'. It has been our constant theme that failures and disasters hold valuable lessons and this has been the foundation of some of my recent books in collaboration with my British co-author, E. A. Stallworthy, e.g., *How to learn from project disasters* (Gower 1983), *Management disasters and how to prevent them* (Gower 1986), *Corporate failure* (McGraw-Hill 1986) and *Company Rescue* (Heinemann 1987). In line with these is our latest title, *Safety in the chemical industry — lessons from major disasters* (Heinemann 1988). This book was, in a way, commissioned by the publishers following our initial proposal relating to the lessons of Bhopal. I expect to use this text as the base for, perhaps, the first ever course in India on Safety in the chemical industry being offered at the Indian Institute of Technology at Powai.

The text dwells on the theme of how the disasters of the past can become the basis of hazard control and risk reduction for the future. From Flixborough (UK, 1974) through Seveso (Italy, 1976) to the

Bhopal (India, 1984) catastrophe, public confidence has been shaken by a series of accidents, whose true causes and effects have often been obscured and even misrepresented by media coverage. Fortunately, the chemical industry on the whole has an excellent safety record, and recent management initiatives in applying the lessons of past mistakes and of bridging the communication gap between the technical plant operator and the nearby community show what can be achieved.

This book is perhaps the first one dealing exclusively with the safety aspect in the chemical and process industry in the light of major disasters since Oppau (Germany, 1921). It begins with the concepts of safety, hazard and risk, and go on to examine the key hazards areas of storage, transport and plant and the key issues of prediction, panacea, prevention, economics and regulation. No punches are pulled in itemizing failures in operating and management procedures that have led time and again to disaster. At the same time, we have tried to present a realistic view to take into account inevitable human fallibility and the limitations of prediction. Accidents can never be eliminated completely, there will always be some risk: man is a frail creature and far from perfect, but the system which he himself designs and operates under can be so organised that mistakes are less likely to occur, and the effects of those that do occur are contained or minimized. The description and analysis of 9 major disasters in the chemical industry serve as the backdrop of the lessons and how to apply them.

The book is dedicated 'to safety engineers, safety managers and their like, whose mission in life is to make process plants

SAFE, SAFER, SAFEST
for their fellows and for themselves'.

POTABLE ALCOHOL UNITS:**Raw material-related policy likely**

The Union Government may allow the new potable alcohol units to come up in specific areas only related to a particular raw material. The quantity of raw material to be used by such units should be pre-determined and be made available on a long-term basis without creating ripples in the market.

This proposal came up for consideration at a meeting of the inter-Ministerial committee set up to look into the implementation of the new molasses and alcohol policy, as per which fresh capacity for potable alcohol would be allowed to be created provided the raw materials used are of a non-traditional variety.

The meeting, held in New Delhi recently, was presided over by the Chairman of the committee, Mr. H. K. Khan, Secretary in the Department of Chemicals and Petrochemicals. Representatives of States also took part in the meeting.

It was felt that the technology to be adopted by these units must permit the use of different raw materials as alternatives so that the licensed units do not get bogged down on account of being tied to a single raw material which may not be available in sufficient quantity at a given point of time.

It was suggested that the guidelines should specify the raw materials that can be used and these should also be mentioned in the licence or registration. Only those raw materials should be selected which are either available in sufficient quantities or whose production is flexible to demand. Damaged wheat and rice should only be allowed through recognised agencies.

One view expressed at the meeting was that licensing should be allowed freely without much restrictions, so that market forces could operate. This would also ensure better remuneration to agricultural and horticulture growers whose products will be in greater demand and commercial purchasers will be able to pay a better price.

It was suggested that an assessment should be made about the present gap in demand and supply of potable alcohol and quantitative limits should be fixed on new licences to be approved in the next three years. There should be

periodic assessments on the impact of consumers of these raw materials and the policy should be reviewed on that basis.

The ban on creation of additional capacity or expansion of existing capacity for distillation or brewing of alcoholic drinks since 1975 was relaxed time back on the condition that raw materials other than molasses be used. This was done to ease the demand pressure on molasses so that the growing needs of the alcohol based chemical industry could be adequately met from alcohol made from molasses and the over-all availability of alcohol increased.

The committee under Mr. Khan's chairmanship was set up to look into the supply of various alternative raw materials for manufacture of potable alcohol, the capacities to be allowed for manufacture of alcohol from each of such alternative raw materials without detriment to the interest of other

existing users of these raw materials and suggest guidelines for consideration of applications for grant of letters of intent and licences for manufacture of potable alcohol.

ISOPROTURON IN ADEQUATE SUPPLY: GOVT.

The government declared recently that adequate quantities of isoproturon a weedicide used in wheat cultivation are available to meet the country's full requirements.

According to an official release, exports of isoproturon have been banned till January 31, 1988. Besides, Rashtriya Chemicals and Fertilisers (RCF) has been persuaded to supply the required quantity of dimethyl acetate (DMA) to the four manufacturers of isoproturon technical in the country. The full quantity of DMA is being supplied by RCF for the last two months and production of isoproturon has been maximised.

Manufacturers have also been asked to rush supplies to formulators on an emergency basis. The formulators will also supply the traded and state agriculture departments.

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AIDA allowed to export alcohol

Perhaps for the first time, the Government has authorised an association to undertake exports. The association is the All-India Distillers' Association (AIDA) and the commodity is 500 lakh litres of industrial alcohol.

The decision was confirmed recently by the Minister of State for Chemicals & Petrochemicals, Mr. Jaichandra Singh, who had all along denied any move to export alcohol, to pacify representatives of alcohol-based chemical industry, who had criticised exports.

Replying to unstarred question (No. 17) raised by Mr. Balasaheb Vikhepatil and Mr. Mohammad Mahfooz Ali Khan in the Lok Sabha on November 1, Mr. Jaichandra Singh said: "The AIDA has been allowed to organise export of 500 lakh litres of alcohol directly or through their authorised nominees, subject to registration of contracts with the SIC and payment of SIC service charges."

He added that "a clear picture will emerge after the contracts are finalised with the AIDA. On the basis of enquiries received by AIDA, the country is likely to earn a foreign exchange of Rs. 18 crores on this quantity."

Considering the prevailing international price, industry sources are sceptical about exports turning out profitable.

According to their calculations, after deducting the transportation and other sundry charges, the net realisation would be in the region of Rs. 2.25 per litre, which is not only not remunerative but below the local price.

Exports at such terms would be a cruel joke at the expense of the chemical industry in alcohol-starved States which is unable to lift supplies from surplus States because of duty barriers, industry sources complained. They fear that this year's drought may hit the coming sugarcane crop, adversely affecting alcohol production during next year.

Meanwhile, Central Excise officials have started sending demand notices to distilleries, seeking payment of central excise duty, and filing cases for non-payment.

Industrial alcohol, as a State subject, is subject to State levies. Armed with the report of the Government's testing laboratory in Dehra Dun which certified that ethyl alcohol is capable of being used as fuel, excise officials have been charging excise duty at the rate of Rs. 2.20 per litre.

Distillers point out that use of alcohol as fuel is prohibited by law and it is not used as such anywhere in the country. The only exception is the Space Research Centre at Thumba in

Kerala, where it is used in experiments on fuels to propel rockets.

Excise officials admit that alcohol is used solely for production of chemicals and that it is not used as fuel. Nevertheless, they insist that since it is "capable of being used as fuel", levying of duty is justifiable.

Industry sources point out that this is a case of following the letter at the cost of the spirit. Earlier this year, excise officials charged excise duty on distilled water on some pharmaceutical units in Gujarat. Following protests against such absurd interpretations, a Central Excise Notification (No. 255/87-CE) was promulgated on November 25, specifically exempting "distilled water and water of similar purity and liquid air (whether or not any fraction has been removed.)"

IMPORT DUTY ON COPPER ITEMS CUT

The import duty on certain copper items has been reduced with effect from Dec. 30th due to the recent increases in the international prices of copper.

An official release said the customs duty (basic plus auxiliary) on copper matte and master alloys has been reduced to 95 per cent from 125 per cent and the duty on copper (unwrought) and copper rods to 95 per cent ad valorem from 140 per cent.

The customs duty on copper scrap has also been reduced from 145 per cent to 105 per cent.

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3 public sector drug units told to stop loan licensing

The Union Government has issued instructions to the three West Bengal-based public sector drug units to scrap their loan licensing arrangements with private sector companies from next month.

The three public sector units, which have received such directives, are Bengal Chemicals and Pharmaceuticals Ltd. (BCPL), Bengal Immunity Ltd. (BIL) and Smith Stanistreet Pharmaceuticals Ltd. (SSPL).

Under the loan licensing arrangements, companies could loan out their licences to any other party, which would manufacture drugs as per those licences and sell them back to the former. Such arrangements are allowed to facilitate companies utilise their licences even though they may not have the requisite production facilities.

The new drug policy, announced in December 1986, had envisaged that the system of loan licensing would be gradually phased out. This was done to ensure that companies not having production facilities do not retain licences. Also, the system of trading in licences would be done away with by phasing out the loan licensing arrangement.

Accordingly, the Department of Chemicals and Pharmaceuticals, which monitors the implementation of the drug policy, had decided that the loan licensing arrangement for the entire drug industry would be phased out by the end of the Seventh Plan.

The decision to phase out this system over such a long period was taken with a view to reducing its impact on the drug industry's functioning pattern.

In respect of the public sector drug units, no firm decision was taken as to the continuation of the loan licensing arrangements. The other drug unit, Indian Drugs and Pharmaceuticals Ltd. (IDPL), does not loan out its licences to get some drugs manufactured by other companies.

The public sector drug companies which are using this system are BCPL, BIL and SSPL. It has now been decided by the Department these units should discontinue the practice of loa-

ning out licences to other companies from 1988.

At present, these units are loaning out their licences, despite having own production facilities which now go unutilised. These units do not undertake production on their own as they face marketing problems.

The decision to discontinue loan licensing arrangement is being followed up with the implementation of a rehabilitation plan for these three units. These companies have now been instructed to re-orient their marketing strategies so as to ensure fulfilment of their sales targets and to attain higher market share. Promotional efforts are being given a new thrust in this context.

These companies have also discontinued production of some items on account of low volumes of sales due to dwindling demand and negative returns in some cases. For instance, SSPL has discontinued production of several cosmetic products.

The Department is of the view that after the implementation of the rehabilitation plan, these units would improve their financial performance. At present, all the three units are incurring losses.

The performance in 1986-87 for these units was a loss of Rs. 2.12 crores for SSPL on a production of Rs. 9.44 crores, a loss of Rs. 2.98 crores for BCPL on a production of Rs. 12.06 crores and a loss of Rs. 4.62 crores for BIL on a production of Rs. 7.03 crores.

In 1985-86, SSPL incurred a loss of Rs. 1.35 crores on a production of Rs. 8.54 crores. Similarly, BCPL incurred a loss of Rs. 2.9 crores on a production of Rs. 10.04 crores and BIL's loss was Rs. 4.38 crores on a production of Rs. 7.84 crores in 1985-86.

UPA AWARD FOR TWO PHYSICISTS

The N. S. Satya Murthy Memorial Award of the Indian Physics Association for 1987 has been given jointly to Dr. Satish B. Ogale of Pune University and Mr. Milan K. Sanyal of the Bhabha Atomic Research Centre, Bombay.

The award, instituted in memory of late Dr. Satyamurthy, a noted solid state physicist, is awarded to scientists below 35 for their distinguished contribution to the growth of physics in India.

Dr. Ogale has set up facilities in the physics department of Pune University to carry out materials research on surface modifications using laser and ion beams. Mr. Sanyal has carried out important investigations in the field of quasicrystals, a new phase of materials, using multiple, microprocessor-based diffraction facilities, set up by him at BARC.

\$50M INTEREST RATE SWAP FOR ONGC

A \$50-million interest rate swap has been arranged by Citibank for Oil and Natural Gas Commission (ONGC).

The swap, the largest swap done in India, has a maturity of five years.

ONGC has taken advantage of the fall in dollar interest rates following the stock market collapse and has exchanged its floating rate liability for fixed rate liability thus engendering low borrowing cost. The swap is a fine example of taking quick advantage of favourable market movements.

Citibank has in the recent past also helped some Indian corporate entities. It has arranged interest rate swaps for Bajaj Auto Ltd. (\$8 million), Tisco (\$14.45 million) and Ballarpur Industries Ltd. (\$4.8 million). All these companies have locked into fixed cost of borrowings from the earlier floating costs at low levels.

The concept of swaps allows companies to have access to funding rates in different currencies at lower level than otherwise available.

ION EXCHANGE

Ion Exchange has fared well in the six months ended October, 1987 with nearly doubling to Rs. 65 lakhs for the period from Rs. 34 lakhs in the corresponding period of last year. The sales have risen to Rs. 13.85 crores. After providing Rs. 25 lakhs (Rs. 24 lakhs) for depreciation and Rs. 15 lakhs (Rs. 4 lakhs) for taxation, the net profit has soared to Rs. 25 lakhs from Rs. 6 lakhs.

Rs. 100 m investment likely

The department of chemicals and petrochemicals has estimated a fresh investment of Rs. 100 million in thermo plastics with the growing use of petro-based raw materials.

Thermo plastics have varied uses in a number of areas including agriculture, household articles, industrial applications especially in the automobile industry, electronics and teletronics.

The department has taken steps to boost the production of such raw materials. It has also taken steps to rationalise the drug industry.

According to an official release in a bid to rehabilitate the public sector units — Hindustan Antibiotics and IDPL, the department took a number of measures. With the result that Hindustan Antibiotics has turned the corner and would reach the production and sales target of Rs. 90 crores by the end of the Seventh Plan with a projected profit of Rs. 3.50 crores. IDPL made a modest profit by June 1987. It hopes to reach a cash neutral situation in March 1988.

Referring to the production of the staple fibre, the release states that it

has grown from 22,000 tonnes in 1980-81 to one lakh tonnes by 1987-88. The installed capacity also increased to 1.8 lakh tonnes by the end of this year and would touch about 2,00,000 tonnes by 1994-95. Similarly, polyester filament yarn has reached a production level of 1,00,000 by 1987-88. The production of DMT has increased from 23,000 tonnes in 1980-81 to 1,00,000 tonnes in 1986-87. About 1,00,000 tonnes of PTA, a more efficient intermediate is going to be produced shortly with an additional capacity of 3,00,000 tonnes planned.

The projected demand by 1989-90 of polymers is likely to be 7.50 lakh tonnes.

To meet this demand, a new complex with a capacity of 3,00,000 tonnes of ethylene is under construction in Maharashtra and another 1,30,000 tonnes has been licensed for Haldia. Proposals for new complexes at Gujarat, Andhra Pradesh, Karnataka, Madhya Pradesh, Uttar Pradesh and north east region are under examination.

To meet the needs of trained manpower, the Central Institute of Plastics

Engineering and Technology had established extension centres at Ahmedabad, Lucknow and Hyderabad and would establish centres at Bhubaneswar, Bhopal and Imphal.

The government has reduced control over the pricing of drugs through a new drug price control order and reduced the number of drugs under category I and II with the exemption of small scale industrial units from the price control order. Export of basic drugs have gone up from Rs. 33 crores in 1985-86 to Rs. 80.35 crores in 1986-87, indicating a record increase of 142 per cent. The export earnings from dyes and dye intermediates for which West Europe and USA are the major markets have been 99 per cent higher in 1986-87 having increased from Rs. 45.96 crores in 1985-86 to Rs. 91.69 crores in the last financial year.

During the year the Hindustan Organic Chemicals commissioned the phenol project at Cochin. The Indian Petrochemicals Limited launched en-cillite catalyst. The Hindustan Insecticides Limited decided to produce butachlor as a weedicide for rice. The changes in alcohol policy were announced and new capacities for potable purposes from sources other than molasses were liberalised.

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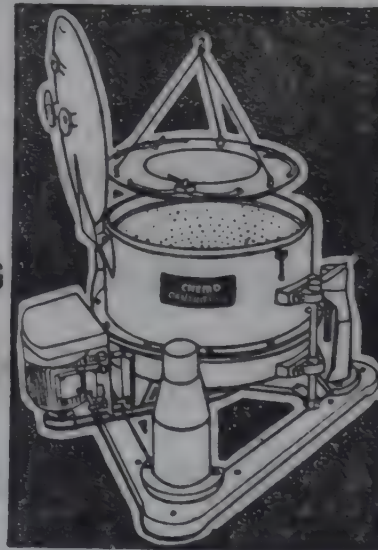
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Record turnover by GNFC

Mr. Rohit C. Mehta, chairman of Gujarat Narmada Valley Fertilisers Company Ltd. (GNFC), presiding over the company's 11th annual general meeting at Narmadanagar, recently stated that GNFC has achieved the highest ever turnover of Rs. 344.21 crores during 1986-87 despite adversities of the drought situation and stock piling.

Commanding the curtailment of imports and price discipline initiated by the Central government, Mr. Mehta analysed the necessity for reimbursement of inventory costs by the government in view of the fact that the industry's production beyond 60 per cent of the capacity is now being held over due to reduced allocation under the Essential Commodities Act.

Allaying the fears about the future of the fertiliser industry, he pointed out that on the basis of the present and future production capacities worked out by the Planning Commission there will be an unfulfilled demand of about 5 lakh tonnes by the turn of the century. As such, the prospects of the fertiliser industry are certainly bright. Additionally, looking to the inherent strengths of the GNFC operations, he sustained its policy of 100 per cent capacity utilisation.

Mr. Mehta noted with satisfaction that every year GNFC has commissioned 2 projects. During the year 1986-87, the 600 tpa butachlor plant and 35 mw first phase captive power plant have been commissioned. During 1987-88, the EPABX project with 20,000 line capacity and printed circuit board project with a 44,000 sq. metre capacity will be commissioned. In the year 1988-89, the 5,000 tpa formic acid project and 25 mw phase II of captive power plant will be commissioned.

GNFC will soon enter into the field of supplying compound fertilisers with its Rs. 237 crore nitrophosphate project producing 1.425 lakh tpa of nitrophosphate, 1.425 lakh tpa calcium ammonium nitrate and 33,000 tpa of concentrated nitric acid. The work on the Rs. 75 crore one lakh tpa methanol project has already started and the 500 tpa phosphoric acid project at Jebe Ali, a UAE joint venture is under active implementation by a new company in the name of Emirates Narmada Indus-

tries Plc. GNFC has also decided to take over Gujarat Insecticides Limited which is engaged in manufacturing a large number of pesticides and insecticides. The Rs. 185 crore colour TV glass shell project and the Rs. 1200 crore petrorchemical complex based on 3.20 lakh tpa ethylene cracker will be soon cleared by the government.

SITE FOR FERTILISER UNIT TO BE SELECTED

The Rajasthan government is on the lookout for a new site for the Aravali Fertiliser Ltd., Sawai Madhopur.

The final site is to be selected at a sufficient distance from the Ranthambhore national park.

Mr. T. N. Seshan, secretary, environment and forests, said he would inspect and approve the final site.

However, the plant will have to be located in the same region to be able to use the gas from the HBJ pipelines.

The earlier site, which an appraisal committee had turned down, was found to be 22 kms from the periphery of

the famous tiger reserve and 28 kms from its centre. This was too close to the national park, it was said.

The move to expand the general engineering works at Bharatpur has also been stopped for the time being. Though the plant, which wants to set up a galvalume unit in the vicinity of the Bharatpur national park, has assured that there will be no pollution from the expanded plant, Mr. Seshan said studies were on to see if the proposed site falls within the Agra-Mathura trapezium where no more industries are to be permitted.

Mr. Seshan said an environmental management agency is being set up for the proposed bauxite mining project of BALCO (Bharat Aluminium Company) in Gandamardhan, Orissa.

The agency with representatives of the ministry of steel and mines and forests and environment will study the effects of the mining on the water streams of the area.

It will study the impact of the project on the ancient temples of the region, air pollution caused by crushing bauxite and loss of medicinal herbs because of deforestation.

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Fertiliser consumption to increase by 2000 AD

Trends in fertiliser consumption in the three years starting 1985-86 have proved them wrong who propound the theory that abundant supplies and a favourable ratio of agriculture commodity price to fertiliser price would result in a satisfactory growth in application of plant food nutrients. Total stocks in terms of nutrients (N+P+K) increased from 2.5 million tonnes at the start of 1985 to 4.3 million tonnes by April last. In the process was witnessed the phenomenon of additional discounts and rebates and erosion in the profitability of the industry.

In 1985-86, the fertiliser consumption at 8.72 million tonnes fell short of the target by 7.8 lakh tonnes. Last year, mainly because of negative growth in consumption in the north zone, the all India consumption increased marginally by 0.5 per cent at 8.73 million tonnes. Because of the unprecedented drought in the current year, it is feared that fertiliser consumption will register a decline of 6.5 per cent.

Mr. Moosa Raza, an authority on fertilisers, has done well to analyse the factors which led to the growth in fertiliser consumption from 1.20 lakh tonnes in 1954-55 to 8.21 million tonnes in 1984-85. From his analysis, it is clear that during the three decades under review, fertiliser consumption increased at a satisfactory rate even though there was no "supply pressure strategy" as is the case since the mid-eighties.

It is established with empirical evidence that in spite of a fragile distribution system and periodic shortages in certain parts of the country — incidentally, some varieties had to be rationed in 1972-73 and 1973-74 — the per hectare fertiliser consumption grew from 0.55 kg in 1954-55 to 47.60 kg in 1984-85. Mr. Raza has pointed out that the fluctuations in weather conditions could not curb the rise in fertiliser consumption since any "unfavourable impact of weather was more or less compensated for by developments on the technological front, infrastructure of complementary inputs, promotional work and marketing policies.

If the growth in fertiliser consumption in the three decades (1954-55 to

1984-85) has been largely due to the spread of irrigation — gross irrigated area increased from 25 million hectares in 1954-55 to nearly 54 million hectares in 1983-84 — and application of high-yielding variety of seeds — the area covered increased from 1.8 million hectares in 1966-67 to 55 million hectares in 1984-85 — the dismal picture of the more recent years, according to Mr. Raza, has been the result of the shortfall in creation of targeted irrigation potential, the widening gap between irrigation potential and its utilisation, slow down in the coverage of area under HYV and unfavourable weather conditions.

It may be recalled that because of "overall resources constraint", the country could achieve an additional irrigation potential of only four million hectares during the Sixth Plan period, against the target of 5.74 million hectares. While at the time of formulation of the sixth plan it was thought that 65 major irrigation projects on hand would be completed by 1984-85. As many as 40 of them spilled over to the current five year plan. What has also impinged on the growth in consumption of fertilisers is the widening of gap between irrigation potential and utilisation from 6.9 million hectares in 1984-85 to eight million hectares in 1986-87.

The Economic Survey of 1986-87 has observed that "delays in construction of field channels and drains, excessive withdrawal of water by upstream beneficiaries, adoption of cropping pattern at variance with those envisaged, etc. have contributed to the sub-optimum utilisation" of the irrigation potential. Mr. Raza thinks that what has made matters worse is poor water management.

In recent years, the coverage of additional area under HYV has not at all been encouraging. It will be seen that while coverage of area under HYV increased from 47.5 million hectares in 1982-83 to 53.7 million hectares in 1983-84, the growth since has been marginal. In 1984-85, the area covered under HYV was 54.1 million hectares and in the following year it was

marginally higher at 55.2 million hectares. The marginal growth has restricted to paddy and wheat, while the coverage in the case of jowar bajra has actually declined.

The Economic Survey notes "except for wheat and paddy, coverage under HYV is still very low. The of growth in the distribution of quality seeds has considerably slackened in the past two years." Against this concerning background, the author will have to bear in mind that the country will need to produce at least 235 million tonnes of foodgrains by 2000 AD to give a somewhat better food deal to a population of 986 million and also provide for food security. Mr. Raza has projected that in order to achieve the foodgrain production target of 235 million tonnes, the fertiliser consumption level will have to be raised to 17.2 million tonnes, the fertiliser crop response ratio being 1:1 in Indian agriculture.

A "supply pressure" of fertilisers as has been the case in recent times will not result in the desired level of increase in application of plant nutrients. What needs to be done for creating conditions for doubling of fertiliser consumption in the next 13 years is to raise the level of irrigation utilisation to 111 million hectares and HYV coverage to 115 million hectares by 2000 AD. If attention is rightly focused on irrigation, HYV cultivation and dry land farming, then the glut situation in fertilisers will prove to be a short-term phenomenon.

There is really not much time to be lost. Three new fertiliser plants using HBJ gas will go on stream shortly. The Guna unit in Madhya Pradesh and NFL is ready for commissioning. If ICI's unit at Aonla in Uttar Pradesh starts production in the first quarter of 1988 and the Jagdishpur unit of Indo-Gulf Fertilisers will be on stream in the second quarter. Between the three, they will produce about one million tonnes of nutrients. In case the infrastructure in terms of command area of irrigation is suitably strengthened, the fertiliser production base of the country will have to be expanded rapidly so that dependence on imports is reduced.

— Courtesy: The Economic Times

January 5, 1988

New mining techniques affect ecology

Studies have found that because of remote sensing techniques in mining areas in Assam, Karnataka and Andhra Pradesh the ecology of those areas had undergone significant changes.

The study noted that solid and gaseous mine effluents like dust and smoke polluted the atmosphere beyond the permissible limit. "Thus the impact of coal mining in the area is immense."

A study by Mr. B. C. Barooah, Mr. K. Chowdhary and Mr. B. K. Barooah, of the Directorate of Geology and Mining, Guwahati, found that the century-old coal mining at the Makum coal belt in upper Assam had far-reaching impact on the ecology and environment of the area.

Among the remedial measures suggested by the study were reclamation of wasteland and prevention of soil erosion by afforestation. Another study on the land transformation process following mining and quarrying activities in the Banganapalle environs in Kurunool district of Andhra Pradesh found that there was a "significant reduction of vegetation cover, due to extended mining and quarry activities". Apart from that, increasing siltation of tanks was observed at Auk, Cherlapalle, Jwalapuram and Pallukuru villages where intensive quarrying activities were on.

The study conducted by Mr. P. V. S. P. Prasada Raju of the National Remote Sensing Agency (NRSA) in Hyderabad, observed that a few perennial springs, located in the villages where quarrying activities were on and which were used for irrigation as well as drinking water purposes, might be depleted if the quarrying activities continued.

Several mining and quarrying product-based industrial establishments were concentrated around Banganapalle which had good reserves of various minerals like limestone, dolomite, as-

bestos, baryte, steatite, ochres and clays, besides significant quantities of iron and copper ore deposits.

The study suggested regularisation of mining and quarrying, avoiding quarrying near the springs or other water sources, afforestation of disused mines and quarries to check soil erosion and siltation.

The third study found that the mining operations of Kudremukh Iron Ore Company had changed the environment considerably in the Kudremukh range in Chikmagalur district of Karnataka which is one of the important hill ranges in the Western Ghats.

The study on the impact of mining on land cover, conducted by Mr. S. Thayalan and Mr. S. R. Naga Bhushan, of the National Bureau of Soil Survey and Land Use Planning, Bangalore, said that the changes which took place around Kudremukh after the implementation of the iron-ore mining, were large-scale devastation of grasslands and shola forests.

The study noted that environmentalists, the mining company and forest department should take care of protection and development of the areas, through the Kudremukh iron-ore mining project was one of the finest examples of environmental improvement and afforestation in the mining area.

The studies were presented at the national symposium on "Remote sensing in land transformation and management" at the National Remote Sensing Agency (NRSA) which concluded in Hyderabad recently.

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Indo-British research project in large plastic deformations

Professor S. R. Reid, Department of Mechanical Engineering, University of Manchester, Institute of Science and Technology is currently visiting India under the auspices of the British Council Division, British High Commission.

The main purpose of his visit is to develop a collaborative research project in the area of solid mechanics studies in large plastic deformations with scientists at the Indian Institute of Technology (IIT), Delhi.

Basic and applied research in the field of dynamic analysis of large plastic deformations is important in view of its wide applicability in many important areas like manufacturing processes, structural engineering and safety aspects in relation to structural damage, crash worthiness, energy absorption etc.

Wide applicability

Professor Reid's work on large plastic deformations is quite well known. The proposed project is important in view of recent developments in the

fields of production processes and other applications. These studies, to a large extent, contribute towards the optimisation of the design of a variety of critically loaded components which find use in a variety of applications.

Further, these studies find application in certain manufacturing processes like rolling, extension, forging, drawing etc., where it is important to be able to predict the shape of the final product. Hence studies in the field of large deformations acquire an additional importance when viewed in the context of indigenous technology being developed. To create a design which is economical, competitive, safe and highly reliable, a concerted effort in this area is required.

The principal contribution which IIT Delhi can make to this process will be via the development of a small dynamic testing unit which would have a role in providing consultancies to both industry and Government, as well as taking an active part in the teaching and research activities of the IIT. An

additional input in terms of a prolonged study of this kind will help the general development of the subject of study both in the analytical as well as experimental areas.

The project will involve a number of consultancy visits from Britain to India, senior staff visits from IIT to British institutions using the special equipment, and provision of British equipment under the Technical Cooperation programme.

ANOTHER HOLE IN ARCTIC OZONE LAYER

Scientists in Bremerhaven in West Germany have tracked down evidence that confirms fears of a second ozone hole developing in the earth's ozone layer this time over the Arctic.

Ozone, an isotope of oxygen, is dispersed through the earth's stratosphere and blocks harmful ultraviolet radiation from the sun reaching the earth's surface. Dramatic falls in ozone levels over the Antarctic have already been widely studied and reported.

West German specialists in earth sciences who have visited both poles have concluded that a similar ozone hole is developing in the far north though it is less serious than that noticed in the last three years over the South Pole.

If ozone in the atmosphere is greatly depleted, the planet's inhabitants will be exposed to more ultraviolet rays, which can cause cancer, cataracts and immune-system illnesses.

The Germans say the northern hole is only about one fifth the size of the growing Antarctic hole, which grew to match the area of the U.S. in 1985 and has since expanded to cover the whole Antarctic continent.

GNFC PROJECT CONTRACT FOR FEDO

FACT Engineering and Design Organisation (FEDO), a consultancy division of FACT, has bagged the contract to provide engineering and project construction consultancy services for the building of the 300-tonne per day methanol project of Gujarat Narmada Valley Fertiliser Co. at Bharuch.

FEDO will undertake procurement of indigenous equipment and materials, including inspection and expediting services, construction management at site and assistance in the commissioning of the project.

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Looming menace to the ozone layer

Evidence that a second hole in the ozone layer may be developing, this time over the Arctic, should be another warning that the world should act betimes to reduce, if not altogether, the use of chemicals called chlorofluorocarbons. It was only 14 years ago that two scientists had to draw attention to the slow damage that these chemicals were wreaking on the ozone layer. Few, if any, heeded the warning, and it was not until three years ago — when scientists spotted a hole in the ozone layer above the Antarctic — that concern, and even fear, for the safety of the planet began to surface in any serious way. Since then scientists, including those from India who went on expeditions to Antarctica, have watched with nervousness the hole growing larger, and the latest observations suggest that the hole may encompass an area larger than that of the United States. While there is yet no conclusive proof that chlorofluorocarbons — used widely as coolant in airconditioning equipment and as propellant in aerosol cans — are entirely responsible for creating the holes, what is accepted is that these chemicals, when let loose into the atmosphere, do deplete the ozone, each molecule of the chemicals being able to wipe out hundreds of thousands of molecules of ozone. If the ozone layer is destroyed, the earth will have lost the veil that shields it from the destructive ultraviolet radiation unleashed by the sun. Scientists have warned that exposure to this type of radiation would intensify the incidence of skin cancer among human beings; crops would be damaged and the ecological system thrown out of balance.

It is to the credit of the United Nations Environment Programme that it could bring some 43 countries together in Montreal last September and have them sign an agreement to reduce the production of chlorofluorocarbons. They have promised first to freeze their production in 1989 at 1986 levels, and to then reduce it by half in the nineties. Whether the governments around the world carry the resolve to enforce such cut-backs remains to be seen, but at least they have signalled their recognition of and concern for the problem, and the desire to act.

Where does India stand here? At the Montreal conference, an Indian delegation was present, but it did not sign the protocol. News reports from Montreal suggest that the delegates were not vested with the requisite authority. If that is true, it is a poor commentary on the Government's appreciation of a grave environmental issue. The inaction at Montreal was no isolated instance, for the Government did not even reply to the U.N. invitation to attend the earlier meeting in Geneva in April. Perhaps the Government is of the view that this is not a serious enough issue. But even if the use of the chemical in the country is as yet limited, it is definitely growing. Aerosol cans that dispense shaving creams, deodorants and air fresheners, for instance, are fast gaining in acceptance. Clamping down on the use of any commodity is least painful when the practice is not as widespread, as it would be with time. If the Government chooses to act now and ban chlorofluorocarbons, it can do so with-

out throwing segments of industry into serious disarray, looking for substitute products or inputs. Later, when the continuing tide of Western technology brings with it a wider use of chlorofluorocarbons, the task of outlawing the chemical will be that much more difficult, and readjustments by industry that much more expensive.

The Hindu

ORGANIC CHEMOILS

Organic Chemoils has achieved a turnover of Rs. 8.50 crores in the first five months of the current year (July-November, 1987) compared to Rs. 2.81 crores in the corresponding period of last year. For the six months ending December, 1987, it expects the turnover to be around Rs. 10.61 crores, the figure achieved for the whole of last year.

The company's new toilet soap has received an encouraging response in the market. Its fatty acids plant is doing well and its stearic acid is not only in demand but fetching high prices. Under an arrangement, Hindustan Lever is to supply on a regular basis soap noodles

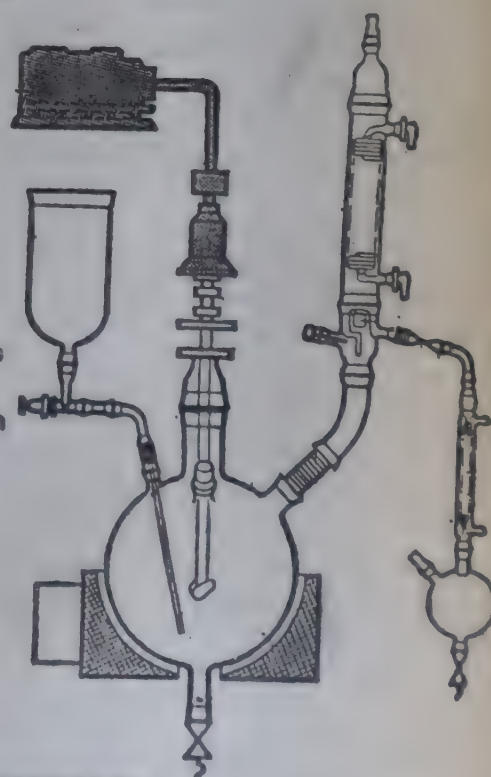
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HCL wants copper price to be de-linked from LME

Hindustan Copper Ltd. has demanded de-linking of copper prices from London Metal Exchange (LME) prices. According to Mr. R. S. Mishra, Chairman, Hindustan Copper Ltd., there was no reality between the Indian and international scenes in the field of copper production.

The price of copper in international market was not related to the actual cost of production.

This affected the development of copper deposits having an average grade of one tonne metal produced from 100 tonnes of ore like India.

Mr. Mishra said that HCL had demanded a "performance-based copper price" taking into account the capacity utilisation, matching the operational cost and metal recovery with other producers in the world having better quality of ore.

Mr. Mishra told a group of visiting newsmen at Khetri in Rajasthan that his company had already been acclaimed as the "best performer in terms of physical performance."

He also said that the government had realised that because of the pricing policy of the Government, HCL the sole producer of copper in the country, had been suffering losses.

Mr. Mishra said that accumulated loss of the company was "quite substantial" and its total would be about Rs. 150 crores.

He said that HCL favoured the mechanism of pool pricing system for copper as 50 per cent of the metal requirement would have to be imported for a long time to come.

Against the demand of 116,000 tonnes in the country, HCL supplied 50,600 tonnes requiring over 66,000 tonnes to be imported.

It was pointed out that the cost of production of electrolytic copper wire-bar during the next four years would be at the level of Rs. 48,600 per tonne — the level achieved in 1986-87.

This would result in the reduction in cost of production by about Rs. 7,500 per tonne.

Based on the cost of production, the total sale price worked out to Rs. 59,400 per tonne including excise duty, interest on Government loan and 12 per cent return on net worth.

Against this the average selling price of copper during 1986-87 ruled at Rs. 46,407 per tonne including the excise duty.

An HCL analysis of costs of various inputs for copper production indicated there had been 92 per cent rise in input cost. Against this HCL cost of production and selling prices went up by 61 per cent and 44 per cent respectively.

HCL claimed that escalation in cost of inputs up to 31 per cent had been absorbed by various measures for cost control.

Copper in the international market at LME rates had been hovering between £1,500 per tonne to £1,600 during last few months against the record price of £1,375 in 1980.

Even at its highest ever price of £1,612 or Rs. 38,000 per tonne remained less than half the price in India. The import of copper to India is subject to 140 per cent excise duty.

As reflected by LME rates, today's market price of copper extruded rods for wire ruled at about Rs. 90,000 per tonne.

In order to deal with the vagaries of LME price, keeping an eye on the revenue for the company, HCL wants to fix a price arrived at by the Bureau of Industrial Costs and Prices.

HCL has been opposing a suggestion for reduction in the 140 per cent duty on imported copper as any reduction would have propensity for the users to go in for the imported supplies rather than the metal products by HCL.

BICP FINALISING COPPER PRICES

The Steel and Mines Minister Mr. M. L. Fotedar, has assured that the Government will consider the interest of both the producers and users while fixing the prices.

Talking to newsmen after laying the foundation stone of a Rs. 3.5 crore effluent treatment plant of the Hind-

ustan Copper Complex in Khetri, Mr. Fotedar said the Bureau of Industrial Costs and Prices was at the stage of fixing the prices for copper.

Mr. Fotedar's attention was drawn to the demand of the Hindustan Copper Ltd. for a remunerative copper price to improve its financial health.

Addressing a gathering after the ceremony he called for reduction in dependence on import of copper and view of its strategic importance.

He emphasised the need to strike a balance between industrial development and preventing the environment from pollution.

Mr. Fotedar advised the public sector units to increase productivity and efficiency to compare with those of countries such as Korea and Japan.

He said that the Prime Minister Rajiv Gandhi, wanted simultaneous environmental protection measures along with industrialisation.

The minister said that the Prime Minister had been working towards giving the public sector units a commanding heights as evolved by Mr. Jawaharlal Nehru.

Mr. Gandhi was going all out to ensure that the public sector became self-reliant in itself and ultimately led to the self-reliance of the country, Mr. Fotedar said.

He said that his ministry had already initiated action in developing a new work culture in the steel industry to improve productivity and production.

Mr. Fotedar said that the setting up of the effluent treatment plant would help in eliminating toxic materials from the effluent for recycling water into the HCL system, thereby providing irrigation water to the drought-affected surroundings.

Mrs. Ram Dulari Sinha, Minister of State for Mines, in her presidential address, said that HCL had already improved its profitability and that its losses this year would be about Rs. 50 crores against Rs. 56 crores two years ago.

She added that from the next year India would be achieving self-sufficiency in aluminium production.

Copper users see threat in recent price hike

Copper's surge to a seven-year high on the London Metal Exchange (LME) — spot prices crossed the 1,500-a-tonne mark a few weeks ago — has prompted the canalising agency, the Minerals and Metals Trading Corporation (MMTC) to hike last month its release prices for the metal by Rs. 13,000 to Rs. 30,000 a tonne, for electrolytic wire-rod and high grade cathodes. It has raised prices for continuous cast copper wire rods, the main input of the cable and electrical sector, to Rs. 88,500 a tonne on ex-godown basis. If LME prices are any indication to go by, further increases in domestic prices are not ruled out.

With copper prices rising from about Rs. 30,000 a tonne in 1980 to Rs. 80,000 in a span of seven years, user industries face a bleak future as they are not in a position to pass on the higher input costs to end users of copper-based products, who are largely Government undertakings like the State Electricity Boards. As the ruling price of copper in India is the highest in the world, domestic manufacturers of copper products have lost their competitive edge in the international market. Liberal imports of components and capital goods had already weakened the engineering industry, a key user of copper in the country.

Criticising the latest hike in MMTC's prices, a spokesman of the All India Small Scale Cable and Conductor Manufacturers' Association said that in New Delhi alone, small cable and wire making units would incur substantial losses on their pending orders thus making their survival difficult. Another representative of the small scale industry said the viability of copper-based industries had already been eroded in recent months following periodic price hikes posted by the MMTC. He said that while the spurt in copper prices on the LME was largely due to speculative activities and growing tightness of supplies in the spot market, the prevailing domestic prices were far above the world market levels.

After a prolonged sluggish spell on the LME in the early Eighties, copper had turned around on the world market this year. The queue-

ze on ready supplies helped the metal to stage a rally on the Commodity Exchange Inc (Comex) in New York some months ago. The currency fluctuations had also influenced the movement of copper prices on Comex and LME but the fact remained that the metal was moving on an upward course. The sharp gains noted by copper in recent weeks should have prompted the Union Finance Ministry to consider appropriate fiscal relief to copper users. But it is yet to take a decision on this issue.

With an import duty of 140 per cent on *ad valorem* basis and a countervailing duty of Rs. 3,300 a tonne, apart from the service charges of about 10 per cent on CIF costs charged by the MMTC and octroi, sales tax, etc., copper has become the most expensive industrial metal in the country compared to world market prices. In 1987, imports were around 70,000 tonnes. The MMTC has reportedly covered a good part of this tonnage by contracts to ensure steady supplies in the pipeline. While a "copper famine" is not in sight, it is the price factor that is crippling the copper-based industries in the country.

As a strategic metal, copper is used by a wide range of engineering industries apart from manufacturers of cables and wires. These industries say that substitution of copper across the board is not possible now from the technological point of view. Aluminium cannot replace copper in all uses. Following the import substitution drive launched by the Government in the Sixties, most industries have cut their copper consumption to the bare minimum. There is little scope for substitution of copper by aluminium or other materials in most sectors, particularly in engineering.

Trade sources say that the upswing in copper prices on the world markets only reflects a passing phase and, according to a market forecast of a well known London-based analyst, a surplus of 1.4 lakh tonnes of refined copper is on the cards in 1988 against a deficit of two lakh tonnes in 1987. With prices firming up on the world markets, the mine output is likely to increase supplies of primary metal in the New Year.

The Government had raised the import duty on copper a year ago with a view to providing some protection to the ailing Government-owned Hindustan Copper Ltd., the sole producer of the metal. The HCL has been pleading for higher prices since it has turned out to be a high cost producer.

Severe constraints

HCL has to mine low grade ores and operate under severe constraints imposed by persistent shortfalls in power supplies and overmanning of its operations, particularly at its copper complex in Ghatsila in Bihar. With a copper content of less than one per cent in its mines (against six per cent in Africa), HCL finds it difficult to trim its production costs. Since its output of high value products is also negligible, HCL has little scope to absorb its higher production costs to bring it in line with international experience.

The Bureau of Industrial Costs and Prices (BICP) is studying HCL's production costs to determine a fair price for the indigenous metal. But senior officials in the Union Department of Mines and the BICP seem to agree that the prevailing prices in the Indian market are too high and that the current situation warrants some reduction in the customs duty. The Government was also toying with the idea of a "pool price" for copper but no decision was taken as there were a few snags in making this concept work smoothly to the satisfaction of both producers and consumers.

Spurt of speculation

The delay in the Government decision regarding relief to copper users led to a spurt of speculation in open market trading. With prices quoted around Rs. 8,200 a quintal in major Indian markets, it is feared that quotations could touch the Rs. 90,000-a-tonne mark which will spell disaster to the numerous small scale copper-based units. "With its prices based on the LME's fluctuating rates, the Government has now become a key factor for the current fluctuations in the open market. As the MMTC revises its prices every month, speculators find it easy to operate in the market without taking any risks," says a dealer.

Oil imports likely to be cheaper

The oil scenario for the country in the new year appears brighter than the year past as imports are likely to become slightly cheaper with an oil price crash on the cards following discord in OPEC over selling prices.

India, which has gone on a major exploratory effort, putting many discoveries in the Bay of Bengal and Arabian Sea including Cauvery river basin on an early production system, had perforce to resort to imports in 1987 mainly to meet the demands of a growing automobile market.

The imports are to be stepped up as the automobile and two wheelers sector is expanding and here the country may cash in on the advantage of softer oil prices triggered by the anxiety of some OPEC members to undersell from the benchmark price of 18 US dollars a barrel and reluctance to adhere to production cutbacks and maintain the 16 million dollars per day norm.

Moreover, the country is also likely to gain by the downward trend of the dollar and the uncertain world economic situation following the stock market crash which is why anxious OPEC members like Iran wanted the benchmark price to be raised to 20 US dollars per barrel which other west Asian nations like Saudi Arabia staunchly opposed to get a greater share of a shrinking market.

Oil analysts say Indian oil imports would touch Rs. 4,300 crore in 1987-88, which is an increase of 66 per cent from Rs. 2,600 crore recorded last year (1986-87). The import bill went up because of the steep rise in the international crude price from 12 US dollars to 19 US dollars per barrel.

This trend is not likely to persist as most OPEC members are not expected to sell crude oil over the benchmark price of 18 US dollars a barrel as per an agreement reached at the Vienna meet.

Prospects of some OPEC members even selling below 18 dollars are distinct but the "price situation" witnessed in 1986, when oil was sold as low as 10 US dollars per barrel, is not likely to be repeated, oil analysts say.

But the big question for the year is will the Government increase the prices of petroleum products as it did with coal, sugar and other oils in a major effort to conserve resources and close the budget deficit? If the price of petroleum products is increased, then the advantage of cheaper oil imports will not be pressed home, the analysts say.

The country produced close to 10 million tonnes of crude oil this year and hopes to increase it to 40 million tonnes before the end of the seventh plan (1989-90). As per the seventh plan estimate, the country will require 88 million tonnes by 2000 whereas the oil companies can produce only 50 million tonnes under the most optimistic conditions.

India will then be forced to import a staggering 40 million tonnes by the turn of the century. The import bill at today's prices would amount to Rs. 8,000 crore in foreign exchange. However, the actual cost on foreign exchange calculated at the expected price of 40 to 50 dollars a barrel would be a staggering Rs. 16,000 crore.

Oil analysts point out that the dipping oil prices of 1988 will steadily pick up in the nineties to surpass even the all time high of 35 US dollars per barrel recorded at the height of the oil crisis in the seventies.

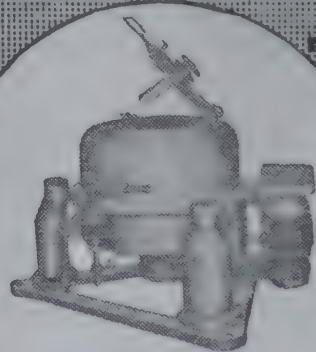
There is, however, a silver lining in the cloud as the emerging oil availability from the oil field is expected to help and partially offset this drain on foreign exchange.

Against this background, as Union Petroleum Minister Brahm Chandra Mehta said in a seminar in Delhi, the Government had chalked out a strategy to accelerate exploitation of coal, hydel and nuclear power, intensify exploration of oil and gas and manage rising oil demand through energy conservation.

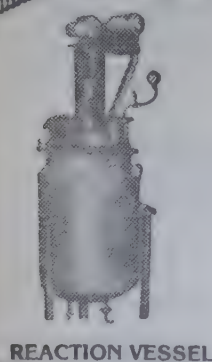
ONGC plan:

In line with the Government's strategy, the public sector Oil & Natural Gas Commission (ONGC), the major oil producer in the country, evolved a 20 year perspective plan for meeting a demand of

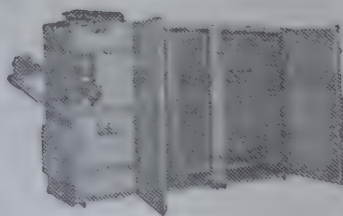
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ion tonnes of hydrocarbons in the early part of 21st century.

ased on prognosticated reserves, basin-wise and basin-wise targets being set by the ONGC, which is a distinct break from the past planning practices.

etroleum product consumption in the country increased from 17.80 million tonnes in 1970-71 to over 43 million tonnes in 1986-87 and consumption in the current year is 44 million tonnes. With present production being only around 30 million tonnes, a gap of 16.50 million tonnes is to be bridged through imports.

ONGC is embarking on novel strategies to increase production which includes enhanced recovery methods, operations to recoup sick wells, and intensified drilling to get maximum wells on production. The ONGC is also working towards the establishment of a national gas grid of which the Hazira-Bijaipur-Dadri pipeline (HBJ) is being executed by the Gas Authority of India Ltd. (GAIL) in collaboration with the French-Japanese consortium Spie-Capag-NKK and Toyo Engineering is a pivot.

The year rolling by saw the first 10 km section of the 1700 km long HBJ pipeline costing over Rs. 1700 crore being completed and the plant at Hazira receiving the first gas flow. A snag, however, appears as the HBJ pipeline would be ready before the end of the seventh plan (1989-90) but

the three power plants and six fertiliser plants to use this gas as feedstock are not yet ready.

The ONGC also drew up an ambitious plan for deep sea drilling to get hydrocarbons in the Krishna-Godavari offshore basin. The programme is to start in 1988 and progress in various phases till 1991.

1987 also saw the foundation stone for the Rs. 1500 crore Karnal Refineries in Haryana being laid by Prime Minister Rajiv Gandhi. Costing over Rs. 1,500 crore, the refinery is to meet the entire demand for petroleum products for the northern region. Tatas will participate with the Indian Oil Corporation in this joint sector project.

The year also saw the agreement being signed between the Government Birlas, and Hindustan Petroleum for the erection of the multicore Mangalore refineries which is expected to meet the requirements of the southern region.

Oil India Ltd. (OIL) the Assam based public sector company showed a marked decline in its profits mainly because of the oil blockades organised by the All Assam Students Union (AASU) agitation which upset production schedules. The Union had demanded the removal of its chairman Major Gen. S.C.N. Jatar for his alleged anti-Assamese policies.

Subsequently, Maj. Gen. Jatar was shifted to National Hydrocarbons in Hyderabad and Mr. Surajit Chaliha, an Assamese was appointed the new chairman. The headquarters of OIL

are also being shifted from Delhi to Duliajan in Assam. OIL had new finds in Arunachal Pradesh and adopted techniques to enhance oil recovery from ageing wells in Assam.

As the year was drawing to a close, two major agreements were signed.

The Government and ONGC signed an agreement with a US firm in three offshore blocks in the Krishna-Godavari basin and one in Palar.

A similar agreement was signed by the two with a Dubai-based Canadian firm for developing the other blocks in the Krishna-Godavari offshore basin.

The country has thrown open 27 offshore blocks for development and more than six leading international companies are in the race.

India and the Soviet Union also signed an oil protocol for stepping up oil recovery operations in the Bay of Bengal.

RECORD SOVIET OIL PRODN.

The Soviet Union, the world's largest oil producer, produced a record 624 million tonnes of crude oil this year, nine million tonnes more than in 1986, oil industry minister Vassili Dinkov said.

The output is seven million tonnes above the plan and breaks the previous record of 616 million tonnes set in 1983, he said. He attributed the results to the reform policy of Mr. Mikhail Gorbachev, which has "eliminated delays" in the oil sector.

He said 38 new oil fields would go on stream next year and 115 new wells would be drilled.

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Sponge iron opens up new outlet for natural gas

The large resources of natural gas — associated and free — from Bombay High and Bassein structures are being used for producing fertilizers and petrochemicals and also for power generation. However, as the absorption of gas in this manner will not be on the anticipated scale due to the delays in commissioning the fertilizer and combined cycle power plants based at the Hazira-Bijaipur-Jagdishpur field, the Gas Authority of India is exploring the possibilities of utilizing this input for other purposes.

Already arrangements have been made with many industrial units for changing over to the use of gas from coal or oil. It is at the same time proposed to step up the capacity for power generation with an increase in the capability of the combined cycle projects of the National Thermal Power Corporation and also establish new units in other centres. But there will still be ample availability of gas for other industries based on this input which are being promoted.

Utilisation problem

While the GAIL is thus faced with problems of optimum utilisation of its potential in the western region, a similar situation is emerging in Andhra Pradesh as arrangements are under way for raising the output of gas both associated and free to three million cubic metres daily in the next three years.

Another promising outlet for gas that is being attempted in a big way relates to the manufacture of sponge iron using iron ore and gas as major inputs. A good beginning has, of course, been made by some sponge iron units using non-coking coal for direct reduction of iron ore as in Kothagudem and Orissa. But one problem or the other has been encountered in perfecting the technique based on non-coking coal because of its high ash content.

The difficulties in this regard will, of course, be overcome and other units too may be coming up in different centres under various auspices. Some profitably functioning units are even thinking setting up medium-sized integrated steel

plants based on sponge iron and these projects may take shape after the Government's decision about the promotion of these units in the private sector.

Scrap shortage

Meanwhile, Essar Gujarat Ltd. has finalised a scheme for producing sponge iron based on iron ore pellets from Kudremukh Iron Ore Company and natural gas from the Bassein offshore fields. The output of sponge iron by the existing units is only around one lakh tonnes annually and the requirements of steel scrap for the mini-steel plants are being met in large measure through heavy imports involving sizable foreign exchange expenditure. The availability of scrap from indigenous sources like ship breaking will increase only modestly and the dependence on imports will increase if the mini-steel plants succeed in stepping up their production with the upgradation of technology and an easier power situation. It has, there-

fore, been considered advisable to take up the manufacture of sponge iron based on natural gas in a big way.

New Hazira project

The proposed plant of Essar Steel which will be a division of Essar Limited in the Essar Shipping Group will have a capacity of 8.8 lakh tonnes of sponge iron annually. The requirements of iron ore pellets will be secured from the Mangalore plant of Kudremukh Iron Ore Company while gas will be available from GAIL. As the required quantities of gas are available now only in the western region, Hazira in Gujarat has been chosen for locating the plant.

An existing unit will be imported and erected and it is claimed that the construction period will be shortened by 18 months thereby. The plant will be the largest of its kind in the world. The Hot Briquetting Technology of Midrex will be utilised and the foreign collaborator now accounts for 60 per cent of the world's sponge iron output based on gas. Also, ninety per cent of the world output is stated to be using for smelting iron ore.

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Bombay High Mangalore pipeline unlikely

Mr. G.V. Ramakrishna, secretary, Union ministry of petroleum and natural gas, indicated in Bangalore on Dec. 29 that a pipeline from Bombay High to Mangalore was unlikely to materialise in view of the limited domestic production of crude.

Speaking to newsmen Mr. Ramakrishna noted that domestic production was not adequate to meet the demand. Bombay High was not only supplying refineries around Bombay and some other coastal refineries at Madras and Cochin but also the inland one at Mathura.

Mr. Ramakrishna noted that in any case crude for the proposed refinery at Mangalore could be imported through the port at New Mangalore and that it was therefore not really necessary to have a pipeline from Bombay High. He noted that at present there was only one crude oil pipeline connecting Gujarat to the inland refinery at Mathura.

The proposed refinery at Mangalore could, he said, go for imported crude unless oil was struck in the nearby offshore areas. Explorations

were going on along the western coast off Karwar, Mangalore and Cochin and the results would be known in a year.

Replying to a query, Mr. Ramakrishna stated that the detailed project report for the Mangalore refinery was expected to be ready by June, 1988 and that the refinery could be completed within five years of the final clearance of the report.

A team of Indian and foreign consultants was preparing the detailed project report for the Mangalore refinery which was to be a joint venture between the Hindustan Petroleum Corporation (HPC) and the Indian Rayon Industries. The project would have an initial refining capacity of three million tonnes but there was provision for further expansion. The other component of the project would be a naphtha cracker unit.

Asked whether there was any move to increase the prices of petrol and petroleum products, Mr. Ramakrishna said, "I have no idea."

PVC RESIN UNITS', GESTURE FOR DROUGHT RELIEF

The newly formed PVC Resin Manufacturers' Association of India has earmarked 15 per cent of the production of PVC resins for allotment through state governments to assist them in their drought relief activities at its meeting held in Delhi recently.

In view of the tight supply position of PVC, it is creditable that five manufacturers viz. NOCIL, Sram Chemicals, DCW Ltd., Chemplast and IPCL, a government sector company, have made this time gesture.

The association, which is under registration, also recently contributed Rs. 3 lakhs towards the theme "Pavilion" at the recent trade fair in New Delhi.

The meeting was presided over by Mr. Shashi Chand Jain, president of the association and attended by D. S. Ganguly, chairman and managing director, IPCL, and Mr. Hasmukh Shah, director of marketing, IPCL.

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Technology for hydrogen driven cars developed

Daimler-Benz AG of West Germany, the leading manufacturer of quality cars and commercial vehicles in the world has successfully developed a technology for running cars and light commercial vehicles on hydrogen.

Perhaps the biggest advantage in using hydrogen to power vehicles is its non-pollutant characteristic. There is no carbon involved in combustion unlike the other alternative fuels such as methanol and ethanol, which are also being tried to run automobiles currently.

According to well-placed company sources Daimler-Benz has opted for metal hydride hydrogen storage units as they provide high standards of safety. Hydride storage is based on the fact that certain metal alloys form a hydride in contact with pressurised hydrogen.

Hydrides allow long term storage and provide the standard of safety necessary when the fuel is carried on board the vehicles.

The sources said Daimler-Benz is carrying out fundamental research into hydrogen storage in metal hydrides and the operation of reciprocating piston engines on hydrogen for some time. The company has already experimented with quite a few vehicles in Germany.

On its first test of vehicles involving five cars and five vans with hydrogen propulsion by customers, these vehicles have clocked a com-

bined running of two lakh kms so far. In Berlin these vehicles are currently used by the accident emergency services, the Senate fleet and the German Red Cross.

These test vehicles are basically standard models which have been modified for hydrogen propulsion. The hydrogen storage unit is designed as a serviceable pack consisting of two liquid heated low temperature hydride storage units.

The hydride material based on titanium or vanadium or manganese is developed by Mercedes-Benz. The development and construction of the storage units was carried out by a subsidiary of the company.

Of the 10 vehicles, five Mercedes-Benz van engines were designed to be driven by only hydrogen. It is the standard four cylinder engine with total displacement from the saloon range fitted with a newly-developed mixture formation system.

The engine in the cars is based on the standard 6-cylinder petrol engine. Hydrogen and petrol are fed in simultaneously through an electronic control. Substituting part of petrol with hydrogen provides better exhaust emission and reduction in fuel consumption over 15 per cent.

The key problem in the conversion of internal combustion engines from petrol to hydrogen, according to scientists in Daimler-Benz, is the commercial viability of carrying hydrogen in metal hydrides.

The federal ministry of research and technology of the West German government has also supported the project to develop hydride propulsion system for automobiles.

Daimler-Benz has been working on hydrogen propulsion in combination with metal hydride storage tanks for many years now. As compared to other research projects involving alternative fuels, hydrogen is particularly interesting as on the one hand the spark ignition engines and hydride storage tanks could be combined with each other without much problem and on the other the pollutant emission of hydrogen powered engines is very low.

IMPORT OF VITAMIN B-6 OUT OF OGL

The Government has shifted import of vitamin B-6 (pyridoxin HCL/pyridoxin base) and intermediates of pyridoxin to limited permissible category from open general licence (OGL).

A public notice to this effect was issued by the chief controller of imports and exports on December 22, but it was made available to the press only today.

Import of these items under OGL by eligible parties will be allowed only to the extent of irrevocable letters of credit already opened and established before December 22, for which shipments are made within 90 days commencing December 22.

The amendments in the import-export policy (Volume I) have been made "in the public interest", the notification stated.

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Schemes Registered with DGTD

AUGUST 1987

List of schemes registered with DGTD (headquarters) during Aug., 1987. Statewise details are given in the order of name and address of the party, location, item of manufacture and capacity:

Andhra Pradesh

Shakelite Hylam Ltd. 7-2-1669, Sahaynagar, Hyderabad-500 018; Shalimar Hyderabad, Andhra Pradesh; Manufacturing Varnishes; 2,500 M.T.

Gujarat

Earle (India) Ltd., 21-D, Sukhala Marg, Bombay-400 001; Dist. Bharuch, Gujarat; Butachlor. Technical (1,500 M.T.) Formulations based on butachlor Technical (7.5 M.T.). Lupin Lab. Pvt. Ltd., 159, C.S.T. Road, Kalina Santa Cruz (East) Bombay-400 098; Dist. Bharuch, Gujarat; Monocrotophos Technical (1,500 M.T.S.), Phosphamidon Technical (1,500 M.T.S.), Dichlorovos (DDVP) Technical (1,500 M.T.S.), Formulations based on aforesaid Technical materials 50% of the Capacity.

S.B. Chemicals and Pharma Ltd., Unit of Unique Chemicals, Sheth Vinodrao Smriti, 83, B&C Dr. A.B. Road, Worli, Bombay-18; Dist. Bharuch, Gujarat; Glyoxal (1,000 M.T.P.a.), Glyoxal (250 M.T.P.a.), Sodium Acetate (By Product) (450 M.T.P.a.).

Haryana

M.P. Kharkia, 125, Cotton Street, Calcutta-700 007; Dist. Rohtak, Haryana; Rigid PVC Pipes, 2,000 T/a.

Ganpathi Petrochemicals Ltd., 4/102, S.D.A., New Delhi-110 016; Dist. Gurgaon, Haryana; Corrugated Flat PVC Sheets 3,600 MT/a.

Karnataka

Eskeyef Ltd., Devenhalli Road, Off Madras Road, Bangalore-560 049; Dist. Mysore, Karnataka; Bulk Drugs;

Maharashtra

FDG (P) Ltd., 66, Lakshmi Building, Sir, P.M. Road, Fort, Bombay-400 001; Dist. Aurangabad, Maharashtra; Orogyal Syrup; 24,000 Ltrs. Industrial Oxygen Co. P. Ltd., 6-8, Poly Maker Chamber-II, Nariman Point, Bombay-21; Dist. Thane, Maharashtra; Oxygen (8.00 MCM). Dombivli, Thane, Maharashtra;

Sharda Chemicals Pvt. Ltd., 48, 1 Road, Bandra, Bombay-400 050; Dombivli, Thane, Maharashtra;

Cypermethrin Technical (25 MTs), Formulations based on Cypermethrin Technical Polymeric Plasticizers (12.5 MTs.).

Pennwalt India Ltd., 507, Kakad Chambers, 132, Dr. A.B. Road, Worli, Bombay-400 018; Dist. New Bombay, Maharashtra; Chlorination Systems for water and waste water treatment 196 Nos.

Uttar Pradesh

U.P. State Industrial Dev. Corpn. Ltd., 117/130, Sarvodaya Nagar, Post Box No. 413, Kanpur-208 005; Dist. Kanpur-Dohal, Uttar Pradesh; Air Pollution Control Equipments; 6,900 Tonnes.

Gujarat

Cadila Lab. (P) Ltd., 244, Ghodsar, Maninagar, Ahmedabad-380 008; Dist. Ahmedabad Gujarat; Tonoli Tablets (200 lacs), Respinorm Tablets (300 lacs), Herbinol (61,200 kgs.), (Metal & Granules) 10,520 kgs.

Gujarat Drugs & Chemicals Ltd., 257, GIDC Indl. Area, Modhera Rd., Mehsana-384 002; Dist. Mehsana Gujarat; Drugs Formulations.

Maharashtra

Rishiroop Polymers Pvt. Ltd. 65, Atlanta, Nariman Point-646, Bombay-400 021; Dist. Nasik Maharashtra; Cypermethrin Technical (25 MTs), Formulations based on Cypermethrin Technical (12.5 MTs), Polymeric Plasticizers (200 MT).

List of Schemes Registered with DGTD (Regional Office), Calcutta during the Month of August, 1987 (State-wise).

West Bengal

Arup Kumar Ghosh 6/8 Gopal Chatterjee Road, Calcutta-700 002; Dankuni Bill J.L. No. 83 P.S. Chanditala Dist. Hooghly West Bengal; 1 (a) Benzene (b) Toluene (c) Xylene (600 M.T.); 2. (a) Light & Heavy solvent Naptha (b) Wash Oil (c) Napthalene Oil (2,000 M.T.); 3. (a) Grerosole Oil (b) Anthracene Oil (4,000 M.T.); 4. Tar Acids (1,800 M.T.); 5. Coal Tar Pitch (10,400 M.T.); 6. Residual Coke (600 M.T.).

List of Schemes Registered with DGTD (Regional Office), Madras During the Month of August, 1987, Statewise:-

Tamil Nadu

B. Vridhagiri 41, Bazaar Street, Vriddhachalam-606 001; Kuppanatham Village Viruddachalam, South Arcot Dt. Tamil Nadu; Dextrose

Monohydrate from starch; 2,000 tons.

List of Schemes Registered with DGTD (Regional Office), Bombay during the month of July, 1987, Statewise:

Ratnadeep Polymers Pvt. Ltd. Ratnadeep Building Eye Hospital Road, Muzaffarnagar; Dehradun Uttar Pradesh (SR); Cellulose Acetate Multi-coloured Sheets; 720 Mts.

Maharashtra

Alkyl Amines Chemicals Ltd. 401-407, Nirman Vyapar Kendra, Plot No. 10 Sector 17, DBC, Vashi, New Bombay; Patalganga Teh-Khalapur Dist. Raigad Maharashtra; Pour-point depressant, flow improver wax & paraffin inhibitor & modifier, 5,000 tons.

Arun Ganpatrao Dalvi 1813, E, 3rd Lane, Rajarampuri Kolhapur; P-Chokak, T-Hatkamangole, D-Kolhapur S-Maharashtra; Diethyl Oxalate; 120 tons./annum.

Goldhoff Auto & Gas Inds Ltd. 2. Turf View, Homby Vellard Estate, Worli, Bombay; MIDC-TTC Area Thane Maharashtra; 1. Oxygen Liquid 28.8 lakh M³/A; 2. Oxygen Gas 11.52 lakh M³/A; 3. Nitrogen Liquid 7.92 lakh M³/A.

Kairov Chemofarbe Inds. (P) Ltd., P-MIDC Mahad T-MIDC D-Raigad S-Maharashtra; 1. Morpholine 500 tons./annum; a. Morpholine Toluene Sulphonate 20 tons./annum; b. Morpholic olerate stearate c. Morpholine Stearate; d. Morpholine Nitrite; 2. 1-4 Dioxane (200 tons./annum) 3. Hydroxy Ethylidene (80 tons./annum) Di-Phosphoric Acid Amino Thimethylene Phosphoric.

4. Alkali Alcohol 200 T/A; Xanthates 5. Water Treatment Chemicals. 50 T/A.

Gujarat

Nitin Rasayan (A Divn. of M/s. Nitin Castings Ltd.) 81-85, Mittal Tower A-Wing, Nariman Point, Bombay-21; Hathoda Teh-Mangrol Dist. Surat Gujarat; 1. H. Acid (360 Mt.), 2. Phenyl Peri Acid (40 Mt.), 3. Laurent's Acid (16 Mt), 4. M.P.D. (14 Mt.), 5. Chicago Acid (18 Mt.), 6. Gamma Acid (18 Mt.).

Raj Prakash Chemicals Ltd. 144, Mittal Chamber, Nariman Point, Bombay; Moti Bhandar Teh-Salvi Dist. Baroda; Synthetic Zeolite; 15,000 tons.

Jayantilal M. Shah Opp. Bank of India Officers Society, Dr. Radhakrishnan Road, Ahmedabad-15; P-Chhatral T-Kolol D-Mehsana Gujarat; 1. Benzaldehyde (600 tons), 2.

Benzyl Acetate (400 tons), 3. Benzyl Alcohol (400 tons).

Vijay Kumar Gupta V-7, Sakal Apt., Naranpur, Ahmedabad; P-Kadi T-Kadi D-Mehsana Gujarat;

Sorbitol; 5,000 tons/annum.

Torrent Chemicals (P) Ltd. Sanskrut High Court Road Ahmedabad, P-Indra T-Kadi D-Mehsana S. Gujarat; 1. H. Acid (600 M.t.), 2. Tobias Acid (240 M.t.), 3. J. Acid (360 M.t.), 4. Gamma Acid (240 M.t.), 5. K. Acid (120 M.t.).

SCHEMES REGISTERED WITH DGTD IN SEPT. '87

List of schemes registered with DGTD (head quarters) during Sept., 1987. Statewise details are given in the order of Name & address of the party, Location, Item of manufacture, Capacity.

Assam

Petresco Eastern (P) Ltd. Jashamanta Road Panbazar, Guwahati-781 001; Dist. Kamrup Assam; Cationic Bitumen Emulsion; 10,000 M.T.P.a.

Gujarat

Core Parenterals Ltd. 4th Floor, Narayan Chambers Ashram Road, Ahmedabad-380 009; Dist. Mehsana Gujarat; Dextrose, Fructose Invert sugar Sodium Chloride 37,00,000; Multi — polyelectrolyte Solution 16,20,000, Osmotic Diuretic Solutions 4,80,000.

Karnataka

Indtech Speciality Chem. Ltd. 3277, 12th Main Hal, II Stage Indira Nagar Bangalore-38; Dist. Hosokote Bangalore; Petroleum Jelly for Telephone Cables 5,000 T., Petroleum Jelly pharma & other Industrial Wax 1,500 T.P.a., 2,000 T.P.a.

Maharashtra

German Remedies Ltd. Shiv Sagar Estate, Block-A Dr. Annie Besant Road Worli Bombay-400 018; Dist. Andheri (E), Bombay; Pyopegn 1 gm Vials (16,964 Kg.), Pyogen 5 gm Vials (34,000 Kg.), Angiografin 50 ml. (30,000 Vials). Angmenfine Tab. 6'S 1,90,000 Packs.

Cipla Ltd. Bombay Central Bombay-400 008; Dist. Raigad Maharashtra; Dilgard 30 10.0 million, Dilgard 60 10.0 Million.

Industrial Oxygen Co. P. Ltd. 68, Jolly Maker Chamber II Nariman Point Bombay-21; Dist. Raigad Maharashtra; Ultra High Purity Oxygen (99.996%), Ultra High Purity Nitrogen (99.9995%), Ultra High Purity Argon (99.9995%). Ultra High Purity Helium (99.9995%).

Madhya Pradesh

Rajaram Maize Products (Dextrose Divn.) Komal Niwas Kailash Nagar Rajandgaon Madhya Pradesh; Dist. Rajandgaon Madhya Pradesh; Dextrox Monohydrate (4,000 M.T. P.a), Hydrol (878 M.T.P.a).

Tamil Nadu

Indag Products (P) Ltd. 62, Spur Tank Road Chetpet Madras-600 031; Dist. South Arcot Tamil Nadu; Sodium Silico Fluoride; 600 tons.

Uttar Pradesh

Indian Maize & Chem. Ltd., 42, Dakshineswar, 10, Hailey Road, New Delhi-110001; Dist. Bulandshahr, Uttar Pradesh; Dextroise Monohydrate based energy food: 1,650 M.T.P.a.

West Bengal

Petrocarbon & Chemical Co., Prop. Hindustan Dev. Corpn. Ltd., Mody Building, 27, R.N. Mukherjee, Calcutta-700 001; Dist. Midnapore,

West Bengal; Calcined Petrol Coke (CPC), 75,000 T.P.a.

List of schemes registered DGTD, regional office, Lucknow during of September, 1987.

Uttar Pradesh

Dharmendra Singh, S/o, Raja Singh, Patel Nagar Orai, Dist. Jalaun, Uttar Pradesh; Kalpi, Jalaun, Uttar Pradesh (A); Industrial Alcohol based on Khanda Molasses; 6,000 Kls. (Provisional Registration).

Madhya Pradesh

Anil Kumar Mittal C/o Niros Enterprises-Sector 'B', Bhilai; Rajnagar Madhya Pradesh (C); 1.0 MCM Gas (1.0 MCM). 2. D A Gas MCM.

List of schemes registered DGTD (regional office), Madras during September, 1987 Statewise Andhra Pradesh

Vijai electricals (P) Ltd. 28, Devel. Area Balanagar, Hyderabad-37; Rudraram Sangareddy M.D. Andhra Pradesh; 1. Epoxies and similar resinous products 1,000 tons. 2. Polyurethanes on polyols and polymeric isocyanates 1,000 tons. MCM.

Tamil Nadu

Southern Agrifurane Industries Ltd., 26 T.T.K. Road, Madurai Mundiampakkam, Villupuram Districts Tamil Nadu, Furfuryl Alcohol 1,000 MT.

V. Subrahmanian T-70 A, Cross Street Besant Nagar, Madurai 90, SIPCOT Indl. Complex Coimbatore SADT Tamil Nadu, 1. Sodium Dextrose Monohydrate (6,000 tons). 2. Dextrose Monohydrate (4,500 tons), 3. Dextrose Anhydrous (1,500 tons.) 4. Mannitol (1,500 tons).

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Ceramic superconductors-challenges ahead

The recent scientific discovery of ceramic superconductors will change and better the quality of life and living of the coming generations. This discovery has been hailed as the greatest in science during the second half of the twentieth century. About six months back, on February 16, 1987, the National Science Foundation announced that Prof. C.W. Paul Chu of the University of Houston and Prof. M.K. Wu of the University of Alabama had discovered superconductivity in a yttrium-barium-copper-oxygen compound at 98 Kelvin (minus 175 degrees Celsius). This announcement started a fierce competition among thousands of scientists from all over the world, especially from the USA, Japan, USSR, China, and Europe. They started researching in ceramic superconductors twenty-four hours a day, seven days a week.

The pace of progress in research was very fast. For about the initial four months, the only way to keep up with the latest progress in ceramic superconductivity research was to watch the reports published in the national newspapers like the New York Times, Wall Street Journal, USA Today, and the weekly news magazines like Time, Newsweek, Insight etc. The science journals could not keep pace with the fast developments in the researches in ceramic superconductors. Of course, quite rapidly the science journals have now adopted the mechanisms for fast publication of the research results. An idea of the extensive research activities at present going on in this field can be formed from the fact that more than a hundred research papers a month are emanating only from Japan. The directions in which the activities have been vigorously pursued during about the last six months and the results obtained in the ceramic superconductors are indicated below.

The temperature at which a material offers no resistance to the flow of electricity is called the critical temperature and at this temperature the material becomes a superconductor. Superconductor conducts electricity without any loss of energy. The critical temperature of the

yttrium-barium-copper-oxygen ceramic superconductor developed by Prof. Chu is 98 Kelvin (minus 175 degrees Celsius). The devices useful for human society fabricated from these materials have to be cooled by using liquid nitrogen. Liquid nitrogen is inexpensive and easy to handle. Of course, an ideal superconductor will be a material which could superconduct at room temperature. This could avoid the use of coolants. Naturally, therefore, the largest amount of research efforts by scientists all over the world for about the last six months have been put into developing materials with the critical temperature about 90 Kelvin.

Numerous claims have been made by many scientists that they have upped the critical temperature. But most of them are still unsubstantiated. Prof. Chu of the University of Houston has reported that his team has evidence of observing superconductivity in his materials at the critical temperature of 360 Kelvin (87 degrees Celsius). No details have been published by Prof. Chu. Scientists of Electronic Control Devices of Troy, Michigan, are claiming a multiphase material superconducting at 305 Kelvin (32 degrees Celsius). Researchers of Wayne State University have published a paper reporting superconductivity at 240 Kelvin (minus 33 degrees Celsius). Prof. A.N. Narlikar of the National Physical Laboratory (at New Delhi) has claimed to observe superconductivity at 299 Kelvin (26 degrees Celsius). Other scientific groups in India pursuing research in ceramic superconductors are groups at the Indian Institute of Science, Bangalore; Indian Institute of Technology, Madras; Bhabha Atomic Research Centre, Bombay, in collaboration with the Tata Institute of Fundamental Research.

From the published reports and from those which have been verified, at present the compound containing the oxides of yttrium, barium, and copper in the molecular ratio of one, two, and three, respectively, are giving the best results. This compound has come to be designated as 123 superconductor for-

mulation. Investigations during the last six months suggest that in the structure of 123 formulation, the function of rare earths is to hold together the copper-barium-oxygen perovskite lattice. It appears that lanthanum and cerium do not match well in the copper-barium-oxygen lattice. Yttrium, europium and the rare earths to the right of europium in the periodic table seem to match well in the lattice and give good superconducting results. For manufacturing of ceramic superconductors this is an encouraging thing because a mixture of rare earths would be less expensive than the purified ones.

Ceramic superconductors are brittle. For their utilization in making various devices they are to be shaped into various different forms. Considerable research efforts have been put into the investigations for methods of preparation of the bulk samples and the wires and tapes of these materials. A research team at the Massachusetts Institute of Technology oxidized an alloy of europium, barium, and copper in pure oxygen at one atmospheric pressure. They obtained superconductor of critical temperature of 90 Kelvin (minus 183 degree Celsius).

The alloy was produced by induction melting of the metals in argon atmosphere followed by dropping the molten metal onto a spinning plate. MIT scientists feel that oxidation of metallic alloy precursor will give a viable route for producing thin films and wires of ceramic superconductors. ATT Bell Laboratory has been successfully experimenting with silver tubes filled with the 123 formulation for obtaining superconducting wires. For electronics uses deposition of thin films on strontium titanate, magnesium oxide, and Kevlar plastics have been tried. The thin film techniques tried have been electron beam and thermal reactive coevaporation, reactive cosputtering, chemical vapor deposition, and plasma spray.

Scientists at IBM Yorktown Heights Laboratory have prepared circuit boards by plasma spraying of yttrium-barium-copper-oxygen superconductor on the substrate surface of strontium titanate. Very high current density has been ob-

tained in the thin films of superconductors grown in the IBM Yorktown Heights Laboratory. The current density measured was 100,000 amperes per square centimeter, good enough for many large scale applications. IBM scientists believe that they have succeeded to the extent that there is no fundamental obstacle to building high field magnets. The 123 family of superconductors need care and expertise in making them in bulk quantity.

The samples which have the sharpest transition at critical temperature are almost always black. At present, sintering technique is used for bulk preparation of the ceramic superconducting powder. Other suggested bulk methods for manufacture of fine powder are the use of precipitation techniques through inorganic or organic routes. Inorganic route might include precipitation of oxides, hydroxides, or carbonates from solutions of the requisite salts. Organic routes might include the precipitation from organometallic salts or forming into sol-gels of the requisite composition.

Why should the newly developed ceramic superconductors have superconducting properties? The present BSC (Bardeen-Cooper-Schrieffer) theory of superconductivity in metals and metallic alloys does not offer any satisfactory explanation. The scientists working for the last about six months have not as yet been able to put forward any possible workable theory. But most of them agree that the superconductivity in these newly discovered ceramic superconductors is connected with the crystal lattice of these compounds. A lot more basic research which is already on will hopefully come up with an answer soon.

The nation which will succeed soonest in commercializing the newly developed ceramic superconductors will hold the economic and technological power and leadership in the twenty-first century. For this alluring compelling reason, there is a tremendous competitiveness generated in the countries like the USA and Japan. On July 28 and 29, 1987, there was a Conference on "Superconductivity: Challenge for the Future" in Washington hosted by the Executive office of the Presi-

dent office of Science and Technology Policy and the United States Department of Energy, and co-sponsored by the United States Department of Commerce, United States Department of Defence, National Science Foundation, and National Research Council of the National Academies of Science and Engineering. President Reagan outlined the initiatives initiated by the Federal Government for the speedy commercialization of the newly discovered ceramic superconductors, by the private industries and enterprises. Intensive discussions are being held to chalk out the plans for the directions in researches in ceramic superconductors so that the USA will be able to retain its leadership in commercialization of the ceramic superconductors.

Some of the items contemplated for production are: (1) ultrafast shoebox size computers making a trillion calculations per second; (2) safe, pollution-free and plentiful energy from nuclear fusion; (3) less expensive, powerful, and pollution-free electric cars; (4) levitating trains travelling safely and noiselessly at 500 kilometers per hour; (5) inexpensive, portable scanners and magnetic resonance imaging machines for medical purposes; (6) sensitive sensors to analyze the magnetic field of the earth for prospecting of oil and mineral deposits; (7) electric power generation at less cost and with at least twice the capacity of the present conventional generators; (8) superconducting power lines to transmit electricity to far off distances without any loss of energy; (9) rechargeable batteries that will store large amounts of electricity; (10) magnetic systems to beneficiate water, coal, clay, and other substances; (11) magnetic bottles to store electricity indefinitely; (12) systems for deep space communications; (13) digital image processors for security systems, automation, remote sensing, motion analysis, and desk-top publishing; and (14) rockets requiring less fuel and able to carry larger payloads.

In the US, till date, there has been only one operational device made utilizing the newly discovered yttrium-barium-copper-oxygen superconductor. In July 1987, the National Bureau of Standards Boulders

Laboratories demonstrated the superconducting quantum interference device (SQUID) made by them. This is a very sensitive instrument for measuring the magnetic fields. In the future this SQUID may replace the present electrocardiogram and may be used in improved computer

The initial euphoria and excitement following the discovery of this new family of oxide superconductors is now tempered with the practical considerations for commercialization. The research activities are stabilizing. The problems to be tackled before taking up of manufacturing are being analyzed. The ongoing researches are directed towards synthesizing and characterizing the oxide superconductors. Efforts are on for upping the critical temperature for superconductivity. Combinations of substitutions in the yttrium-barium-copper-oxygen perovskite lattice are being tried. Even fluorine, sulfur, and phosphate substitutions are being tried. The researches into innovative processing techniques to fabricate electronic and magnetic devices utilizing the brittle ceramic superconductors are being taken up. Some of the processing techniques to be evolved are: (a) production of ceramic superconducting fibers and their incorporation in a metal matrix; (b) deposition of thin films of the superconductor on a ductile matrix using methods like plasma spray sputtering, laser, and chemical vapor deposition; (c) infiltration of a metal matrix throughout the body of a porous superconducting material; (d) coating of ceramic superconducting material on ductile rods and wires; and casting of ribbons and tapes from the ceramic superconducting materials.

The pace of progress and amount of the present activities worldwide in the newly developed ceramic superconductors is so rapid that tens of weekly news magazines devoted solely to these superconductors have sprung up. It is truly a great exciting time for the scientists. They are putting in their efforts for bettering the quality of life and living of the coming generations.

R.L. Thakur

NUCLEAR REACTORS:

Ramanna against imports

The former chairman of the Atomic Energy Commission (AEC), Dr. Raja Ramanna came out strongly against the idea of importing reactors to fulfill the country's target of generating 10,000 MW of nuclear power by the year 2000 AD.

Delivering the Karnataka Electricity Board (KEB) engineers association's second silver jubilee commemoration lecture on "the present status of new sources of energy," Dr. Ramanna referred to rumours in the press that the country was contemplating imports of reactors to fulfill the stipulated target by the end of the century.

He noted that such an appreciation was not correct and pointed out that with equal financial investment, reactors of the required kind could be fabricated indigenously.

However, if the press reports were true and there was a proposal to import reactors on "flimsy grounds", Dr. Ramanna noted that the benefits of development (in terms of jobs and the technological upgradation of industries) would go to other people.

It would also, he warned, spell the end of self-reliance in the field of nuclear power generation at a time when the programme had just begun to pay back. "What has happened to aircraft designers will also happen to indigenous designers in this field."

There will be an erosion of confidence among our scientists, engineers and technicians and the country would have failed to take advantage of the great gift given to us by Pandit Jawaharlal Nehru and Dr. Homi Bhabha," he warned.

He however, noted that there could be no second thoughts on the role that nuclear power could play in solving the country's problem of power shortage. He pointed out that, according to international estimates of the projected power requirements between the years 1985 and 2000 AD, nuclear power would account for 75 per cent of the estimated installed electricity generation in France and 50 per cent in Korea, as compared to 10 per cent for India.

Giving comparative figures for indigenous power stations, Dr. Ramanna

estimated that the total per unit cost of nuclear power (including the expenditure on decommissioning) worked out to 84.59 paise, as compared to 91.10 paise for a unit of thermal power for a plant located at the pithead and 109.18 paise for a plant located 800 km away from the pithead (as was the case for most thermal plants in the south).

He also pointed out that, unlike in the case of coal or oil, it was possible to breed fuel for nuclear power. For instance, the breeder at Kalpakkam made it possible to generate more fuel than the quantum which was burnt, with the possibilities of the extra fuel being used to build another reactor.

He however noted that the biggest objection to atomic energy was not due to a scientific problem, but a political one due to the possibility of misuse by irresponsible leaders. For instance, it was evident that a nuclear weapon was under development in Pakistan according to all indicators (reprocessing and re-enrichment facilities, and a chain of over 1,000 centrifuges operating in that country).

In this context, he regretted that the USA took so lightly the proliferation possibilities in Pakistan. Despite periodic statements by American leaders that they would stop aid if Pakistan was found enriching uranium to levels greater than six per cent, they had changed the laws of their country to exempt Pakistan from any proliferation obligation based on the Symington laws.

He noted that India had nothing to hide and that if it did not permit international inspection of its nuclear reactors, it was only because the superpowers were not prepared to permit similar inspections of their military reactors. He felt that it would be nice if some agreement for a total safeguard system was possible and if the big powers realised that confrontation should be eliminated.

He hoped that the recent Gorbachev-Reagan agreement would not turn out to be a paper treaty of the kind which was signed so often during the 1930s.

Referring to the Dhruva reactor, Dr. Ramanna noted that it was working at

full capacity for the last 10 months despite the reservation expressed in the initial stages by a section of the Indian press, especially a popular magazine brought out by a leading newspaper group.

Karnataka minister for power and industries, J. H. Patel maintained that his government was fully committed to the speedy implementation of the nuclear power project at Kaiga. There was, he said, no other way out, if the state wanted to progress.

While not questioning the motives of people like Dr. Shivaram Karanth and other critics of the Kaiga project, Mr. Patel pointed out that there was really no alternative to the development of nuclear power. The state was in the thick of an acute power shortage and his ministry was being deluged with requests from all sectors, from farmers who wanted more power for IP-sets, from industries who wanted power for running their factories, and from domestic consumers.

The minister noted that what was true for Karnataka was even more valid for the country as a whole. Noting that an advanced country like France could have 75 per cent of its power from nuclear sources, he pointed out that a poor country like India, with almost half its population below the poverty line, could not afford to dither on the question of going in for nuclear power. "If the gap between the haves and the have-nots keeps increasing, problems like food, clothing and employment get aggravated, there could one day be an explosion of a kind which could make Chernobyl seem irrelevant," he quipped.

The minister regretted that there was always criticism whenever the state took any action to solve the power problem. For instance, there were some difficulties in acquiring land for the proposed thermal power station at Mangalore. "When we take up hydel projects our critics talk about the ecological imbalance, when we look at thermal projects they talk about pollution, and when we plan for atomic power projects they claim it is suicidal. Maybe, they want us to go back to the caves," the minister quipped.

KEB chairman B. G. Rudrappa noted that, based on a conservative demand and growth-rate of nine per cent a year, one committee had estimated the

(Contd. on p. 66, col. 3)

PETRO-CHEM PROJECTS:

Ministry to go ahead with licensing

The industry ministry has decided to go ahead with licensing of major petrochemical projects in spite of objections raised by the finance ministry.

It was decided to proceed with the original proposals formulated for setting up olefins and aromatics complexes at an estimated cost of Rs. 10,000 crores in the Seventh Plan in order to meet the country's growing demand for plastics.

The industry ministry, it is reliably learnt, has informed the finance ministry that although these projects are highly capital intensive, it would not be feasible to freeze licensing of fresh capacity. The issue of funding these projects, it is pointed out, will have to be examined by the financial institutions and various options explored for meeting their financing needs.

The finance ministry had recently, suggested to the industry ministry that it should think in terms of putting a curb on fresh licensing for capital intensive projects like petrochemicals. The suggestion was made in the context of the severe drought this year and expectations that substantial central assistance will have to be given to states to tide over this problem. A sizeable outgo of resources to states would naturally result in reduced availability of funds for other capital intensive projects.

The industry ministry, however, is of the firm view that petrochemicals projects are of considerable significance for the country for numerous reasons including the need to replace wood-based products by plastics to prevent environmental degradation. It is, therefore, essential to continue the normal process of licensing for important projects in order to ensure that these are commissioned on time and the country's demand for plastics is met through indigenous production. As far as funding is concerned, official sources maintain that a major chunk of the requirements can be met from capital markets as well as from financial institutions. In addition, international financing agencies like the World Bank are prepared to provide loans on concessional terms for the petrochemicals sector. The Maharashtra gas cracker unit at Nagothane, for instance, is be-

ing set up with partial assistance from the World Bank.

The present proposals for increasing production capacities in the petrochemicals sector are quite ambitious, as many as six large petrochemical projects are on the anvil at an estimated investment of Rs. 10,000 crores.

The programme for creating additional capacities in the petrochemicals sector had been initiated following the assessment of an official committee for perspective planning. It had estimated that the demand for plastics for domestic and industrial uses would rise substantially in the coming years.

As a result, it has been decided to set up two aromatics complexes at Saleempur in Uttar Pradesh and in Tamil Nadu to be implemented by the Madras Refineries. In addition five olefins complexes are being set up. This includes the Maharashtra gas cracker which is already under implementation as well as the Haldia Petrochemicals. The other three olefins complexes will be set up in Gujarat, Mangalore and Visakhapatnam.

The demand for plastics is expected to rise by 14 per cent annually which will lead to a wide gap between availability and demand by the turn of the century. In the case of polymers including synthetic rubber, the gap is likely to rise from 8.48 lakh tonnes in 1989-90 to 2.72 million tonnes by the year 2000.

INDIAN & US SCIENTISTS IDENTIFY AREAS

Senior Indian and U.S. scientists have identified new areas in science and technology for fresh initiatives. The panel which met in New Delhi under the joint chairmanship of Indian S and T secretary Dr. Vasant Gowarikar, and American scientist Prof. W. E. Gordon, suggested studies of the current drought in the context of global climatic conditions, monsoon studies and bio-technical research in agriculture, according to a press release.

The panel took note of this year's drought in India and its various aspects: (i) climatic, including the effect of the world's oceans, especially tropical, (ii) hydrological, including groundwater, run-off and water management, (iii) plant response to water stress es-

pecially under rain-fed conditions, and (iv) conservation aspects related to floods, drought and desertification.

Under monsoon research, the panel recommended major diagnostic studies on the global interdependent features and conditions, preceding and leading to this year's drought in India. The study would use satellite and conventional data as well as atmospheric and oceanographic data.

Bio-technological research in agriculture is another programme to be considered. The molecular biological aspects of the continuing programme on nitrogen fixation are also to receive enhanced attention along with new facets dealing with the basis of drought tolerance in rain-fed crops, and the pl factor in the effectiveness of nitrogen fixation. Significance has been attached to exploring and taking up new projects on processing ceramics.

In view of the fruitful experience with the STI process and mechanism, the panel recommended retention and development of key elements characterising STI. Both panels agreed that the bilateral STI mechanisms need consolidation, development, and reassertion in the coming years to launch new endeavours.

(Contd. from p. 65)

state's shortage of power at 3,000 lion units (mus) by the end of the Seventh Plan, while another committee had estimated a shortage of 10 mus by the turn of the century.

Noting that this would require augmentation in power-generation capacity of 7,500 mw, Mr. Rudrappa pointed out that the only solution was atomic power since the setting up of thermal power stations required good transportation systems and of water, whereas these resources were limited even for the expansion of the Raichur Thermal Power Station (PS).

Again, the micro-hydel systems and the wind characteristics in the region were not suitable for generation of adequate power, while the solar electric route would not be successful, especially in the near future.

The KEB chairman advised his engineers to pay greater attention to the quality of service. "The transformation need not fail, the conductors need not snap and kill people. This is a new technology field to which not enough attention has been given," he said.

Offshore oil probe award faulty on many counts

At the first flush, the Union Government's decision awarding on December 16 four offshore oil blocks to Chevron-Texaco of the US and International Petroleum Corporation of Dubai comes through as an important step in the field of domestic oil exploration. In reality, it is far from it.

If the feeling harboured by India's petroleum circles is anything to go by, the Union Government, in deciding on giving foreign companies in, may have given away more than what it thinks it has gained or will gain in the next three years. How?

By the Government's own admission, it has opted for the overseas petroleum companies with a view to achieving self-sufficiency in petroleum production through acceleration of operation of the Oil and Natural Gas Commission (ONGC). Apart from the lofty objective of self-sufficiency, the assumption that the cash-flush overseas companies will bring in substantial funds for investment also influenced the Government's thinking in this regard.

No matter how much the deals with Chevron-Texaco and International Petroleum are eulogised in public, officials, private, say the decision on international leasing is flawed on many counts. For instance, the extent of investment.

Although the Government is counting on some heavy inflow of funds over the next three to four years, Petroleum Ministry and ONGC officials feel that Chevron-Texaco and International Petroleum, and Shell of the Netherlands, going to be contracted shortly, will not be putting up more than \$150 to 200 million for the designated blocks. In support of their contention they cite 1980 when Chevron, responding to the first round of offers, got the Saurashtra block and spent about 20 million before calling it a day.

According to official sources, the issue of anticipated investment had come up for discussion at the innumerable rounds of meetings of the committee that oversaw the process of the award of oil blocks since March 1986. Set up by the Petroleum Ministry, the committee also consisted of

and such State-run oil companies as ONGC.

The dissenters on the committee, it is learnt, argued that as it was ONGC and OIL together spent about 2,500 crores on their own programmes for exploration and exploitation every year. By contrast, the three overseas companies' combined anticipated investment of \$150 to 200 million (at the rate of \$10 million a well) would be puny.

Why is it assumed that the overseas companies will not be required to spend much on the block? By all accounts, Chevron-Texaco and International Petroleum have been awarded blocks in Krishna-Godavari and Cauvery basins where the risk element is considerably low because of the available knowledge of the proved reserves in the two basins.

As the philosophy of international leasing of oil blocks envisions, an overseas company is associated by a country in its petroleum exploration and exploitation programmes, especially in relation to high-risk areas where prospects are uncertain and basic data are required to be generated for prognosis.

Thailand, for instance, some time ago, threw open offshore blocks for international participation and got an information base ready for its high-risk sedimentary basins.

In fact, India's first two rounds of offers in 1980 and 1982 for international leasing were made along this line when the objective was to get rich in knowledge about the country's unknown sedimentary basins through the help of the overseas companies. The early rounds did not click much because of stiff terms and conditions.

In the early eighties, petroleum circles feel, the Government's accent on overseas companies was justified, in that ONGC had not, till that point of time, achieved its present successes in Krishna-Godavari and Cauvery basins. They came about between 1982 & 1985. But in 1987, when ONGC and to a good extent, OIL were performing well, the Government relaxed its terms and conditions to rope in the companies and, in the process, gave away too much.

According to sources, the relaxation was prompted by a UK-based consult-

ancy firm which was retained by the Government to advise it in relation to international leasing. The firm also worked out the strategy for promotion of the blocks in the international market. Although ONGC favoured handing over of the "geologically unknown blocks" to the foreign companies, the consultancy firm reasoned that since the first two rounds flopped because of the Government's insistence on such blocks it would be wise to allot "low risk" blocks to the companies in the third round.

In the third round the sources said, the Government developed a strategy to work out a package by hitching the "high-risk, somewhat unknown" blocks in Mahanadi and Saurashtra basin on to the relatively lucrative Cauvery and Krishna-Godavari blocks. But when the companies showed reluctance to such a package, the idea was dropped. The Bengal offshore also failed to stir any interest. Interestingly, the foreign companies would now be in a position to use the data base, created by ONGC over the past few years.

As for terms and conditions set for the third round, the companies, unlike the first two rounds, would be under no compulsion to drill wells by a given period of time.

For instance, after carrying out a seismic survey, a company, according to the contract, would be in a position to keep the block at its disposal without drilling any well. Similarly, unlike in the past the companies would be allowed to pull out any time. Incidentally, in the first round Chevron could not quit before drilling a certain number of wells.

As per the agreement, the company, in case of a successful strike, would have to make its first offer to the Government. Since the transaction would have to be done at international rates and in US dollars, the country would not get any mileage out of the deal. In reality, it would amount to purchasing oil from the international market.

Apart from the third round terms and conditions, the country's experience with the foreign petroleum companies such as Reading and Bates (worked in 1975 in the Kutch), the Natomas-Carlsberg group (worked in 1975-76 in Bengal offshore) and the Asamera group (worked in 1975 in the Gulf of Mannar) were also raised at the committee's meetings. However, the Government decided on awarding the blocks overriding all objections.

NATURAL GAS USE :

Rs. 2000 cr exchange may be saved by 1990-91

With the thrust now being given to production and utilisation of natural gas, the total foreign exchange savings effected by substituting it for imported crude are expected to touch Rs. 2,000 crores by 1990-91.

According to official sources, during 1986-87, the country is estimated to have saved about Rs. 1,025 crores in foreign exchange by utilising indigenously-produced natural gas as a substitute for various imported crude derivatives.

Natural gas production in the country is expected to double before the end of the Seventh Plan. The current production rate of about 22 million cubic metres per day is to be raised up to 45 million cubic metres by 1989-90.

As on January 1 last, the gas reserves in the country totalled 1,005 billion cubic metres, which are expected to go up to 1,231 billion cubic

metres by the end of the Seventh Plan. Huge reserves of gas have been located in the Bombay offshore, Tripura and Krishna-Godavari and, to some extent, in Rajasthan and Andamans. Chances of finding more in these basins as also in J & K and Himachal Pradesh are also bright.

Presently, natural gas is being used as a feedstock for fertilisers, ammonia and petro-chemical industry as fuel for power generation, iron and steel industry, cement and ceramics industry and domestic gas supply.

In the fertilisers and petrochemicals sectors it replaces naphtha as feedstock. For fertiliser not based on gas low aromatic naphtha (LAN) is used, which at present is being imported. The use of natural gas in the major fertiliser complexes based on natural gas brings about a saving of more than Rs. 400 crores annually.

According to informed sources, by

the end of the Seventh Plan almost half the gas production will be from free gas fields, mainly from the South Bassein fields. These gas fields will be producing 20 million cubic metres per day by the end of the Plan period. The gas from these fields is sour and will have to be sweetened before it can be used by downstream units. Gas sweetening projects are at an advanced stage of implementation.

The HBJ pipeline is the main conduit through which this gas will be transported. The pipeline, as designed, can initially transport up to 18 million cubic metres per day and has an ultimate capacity of 33.4 million cubic metres per day.

There is also a proposal for setting up LPG plants along the HBJ pipeline. The fertiliser plants the pipeline is feeding are expected to consume about nine million cubic metres per day and the two power plants about four million cubic metres per day. The rest of the gas will be utilised for LPG extraction and KRIBHCO fertilisers at Hazira and for the other plants proposed along the pipeline in order to ensure that there is full utilisation of gas, fall-back consumers are also being developed along the pipeline who would take the gas when the regular consumers are not able to lift their required quantities.

A host of industries have sprung up in Gujarat as a result of availability of natural gas. In Andhra Pradesh 63,000 cubic metres of gas per day during 1986-87 113 crores in foreign exchange were saved in the industrial fuel sector, which is expected to increase to Rs. 230 crores in 1990.

Production of natural gas during 1986-87 was 8176.12 million cubic metres. While it is possible to go on to the development of a free gas field and plan in a co-ordinated manner for its utilisation with the downstream facilities to a reasonable extent it is not so in the case of associated gas.

As yet it has not been possible to make use of the total associated gas which is incidental to oil production due to lack of demand, which is largely due to delays in creation of downstream facilities as also inadequate take by the committed consumers. However, the gas utilisation has stood at 58.7 per cent in 1986-87 and has improved to 76 per cent in 1987.

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CONTRACTS FOR GAS SUPPLY:

Guarantee clause to be included

The Oil and Natural Gas Commission is planning to enforce a minimum guarantee clause in all future contracts supplying natural gas. This has become imperative, according to ONGC sources, as a huge amount of Rs. 100 crores is lying outstanding with a number of consumers, mostly public sector undertakings.

The minimum guarantee clause states that a consumer, no matter whether it actually consumes or not, will be required to pay 90 per cent of the cost of total volume of gas it has committed to purchase.

Of the total outstanding amount, as much as Rs. 1,070 crores are lying with public sector companies producing fertilisers & power and only Rs. 80 crores with a handful of private sector companies mostly located in Gujarat.

The non-payment of dues has really put ONGC in a fix. These companies, when approached by ONGC for payments, all had a stock reply: "If we are not taken your gas, you would have perhaps flared it up, so why insist on payment?" In fact, ONGC, being a public sector undertaking, would not always insist on payment as the major defaulters are also government undertakings. Even meetings at the ministerial level to sort out the problem do not always yield results.

However, ONGC has constituted a "black" team whose job is only to collect dues from these companies. In 1986-87, ONGC earned a profit of Rs. 84 crores which, it is felt, would have been substantially more but for the outstanding amount.

Gas production in ONGC started in 1961 from Cambay at the rate of 0.01 million cubic metres per day. The production in 1986-87 was of the order of 8,176.12 million cubic metres of which 6,705.31 million cubic metres came from Bombay High alone. However, it has not been possible to make proper utilisation of the available gas, particularly of the associated gas which is incidental to oil production. In the North-Eastern region large quantities of associated gas are flared up every day as there is no demand, nor a downstream facility.

Yet ONGC has suggested in improving the utilisation level over the years from 58.7 per cent in 1981-82 to about 76 per cent in 1986-87 through constant monitoring of utilisation by different industries and proper planning for diverting excess gas for optimal use.

ONGC's major gas fields are now located in Bombay High, which is already supplying gas for producing fertilisers, power, LPG and petrochemicals through the urban terminal and South Basin. Currently it is supplying gas through the Hazira terminal to Kribhco's fertiliser plant. The Tripura basin, currently supplying about 100,000 cubic metres per day to the Tripura State Electricity Board with a commitment to supply one million cubic metres a day by 1990 and three million cubic metres by 1993, and Assam gas field at present supplying 5.3 lakh cubic metres a day to Assam State Electricity Board, Namrup fertiliser plant and some tea gardens with the prospect of supplying another 90,000 cubic metres to the Nagaland Tuli unit of Hindustan Paper Corporation, are also among ONGC's major gas fields.

The new gas field which is to supply gas in the near future is located in the Krishna-Godavari basin. From 63,000 cubic metres of gas a day initially it is to be raised to three million cubic metres by the end of the Seventh Plan.

The Rs. 327-crore Gandhar project in Gujarat, cleared by the Public Investment Board recently, is slated to produce 16.26 lakh cubic metres per day.

MUTUAL TECH TRANSFER: ONGC SIGNS PACT WITH FRENCH CO.

The Oil and Natural Gas Commission (ONGC) has signed a memorandum of understanding (MoU) with Campagne Française de Pétrole (CFP) for mutual transfer of technology.

The MoU with the French company will be effective for a four-year period.

The MoU, it is learnt, is based on the principle of equality and mutual benefit between the parties concerned regarding hiring of services in specific areas of interest on call basis. The

ONGC will also be able to participate in third country oil projects in association with CFP.

The areas covered under the MoU are: Development of thin rim of oil with large gas cap and acquisition for simultaneous production of oil and gas; exploration, evaluation and development of fractured reservoirs; planning of development schemes for subsurface and down hole facilities for gas lift and drilling of high pressure, high temperature and super deep wells.

The CFP incidentally will provide know-how to the ONGC besides training its personnel. The experience and knowledge so acquired by the ONGC personnel could be used in other countries where CFP is engaged.

The MoU also covers drilling under sub-hydrostatic conditions, multiple completion and drilling in deep waters with a depth of 200 metres or more.

Meanwhile, the ONGC recently bagged a contract worth \$1.43 million from the Abu Dhabi National Oil Company (ADNOC) for carrying out a survey of stratigraphy and hydrocarbon potential of jurassic sequence to Abu Dhabi.

The commission, incidentally, trained engineers from Bahrain National Oil Company (BANOCO) in advanced drilling technology at its Institute of Drilling Technology.

CAPROLACTAM PLANT FOR SINDRI

The modalities were being worked out for setting up of a Rs. 450 crore caprolactam plant at Sindri. Official sources said a Delhi based Sriram Fibres Company had agreed to set up the plant under joint sector. Indian Fertilizer Corporation and the Bihar Government have sponsored the plant, the sources said.

They said top officials of Indian Fertilizer Corporation, Managing Director of Sriram Fibres, Secretary of State Financial Corporation and Chairman-cum-Managing Director of State Industrial Development Corporation made a survey of Sindri recently.

The sources said that setting up of the plant at Sindri instead of Barauni would save at least Rs. 100 crores on establishment cost. Work on construction was likely to start within two months, the sources said adding that the responsibility of making available power rested with Sindri Fertilizer Corporation.

Role of plastics in the national economy

"The recently concluded Plastics India '87, the India International Trade Fair held at New Delhi was a milestone in the annals of the Indian plastics industry. The exposure helped in projecting visually in a telling manner the tremendous strides made by the Indian plastics industry during the last 40 years", said Mr. Anil Goradia, AIPMA President at a press conference in Bombay. He said that it was heartening that the plastics industry was now being given, though belatedly, due recognition. "By making plastics the major theme of this prestigious International Trade Fair, the Government has demonstrated its keen interest in the growth of the industry."

Mr. Goradia further said: "the Plastics Theme was organised with active association of the Plastindia Foundation which includes the All India Plastics Manufacturers' Association, Plastics & Linoleums Export Promotion Council and other bodies connected with the plastics industry. The plastics theme covered the entire programme of plastics production, machinery and equipments, new product ranges, technologies and business interaction. The display included the following sectors:— (1) Raw materials, (2) Machinery, (3) Ancillary goods, (4) Adhesives, (5) Processors and Fabricators, (6) Electronics, (7) Packaging and food items.

Unique Exposition

The exposition provided a unique opportunity to the different segments in the plastics industry to display their capabilities and also highlight the technology and achievements made despite numerous constraints. More than 400 companies from about 40 countries participated in the Fair. Indian companies accounted for nearly 100 representing different sectors of the industry (A statement of the companies that participated is enclosed). Various States in India as well as several foreign countries participated wholeheartedly to display their developed products. The pavilions of United States of America, USSR and Italy attracted much attention. At the same time the Pavilion of Plastics India '87 was second to none in drawing visitors as it was very educative and informative.

The manufacturers of blow moulded

products and injection moulded products for domestic and industrial use also participated displaying their newly developed machinery and new technology. The pavilions of Messrs. Kolsite, Brimco Plastics Machinery Pvt. Ltd. and Klockner Windsor India Ltd. attracted much attention from the visitors. Kolsite displayed their three-layer rotating die co-extrusion plant and Agglo-Merator Twin screw extruder and automatic bag making/cutting and side sealing machine. Messrs. Brimco Plastics Machinery Pvt. Ltd. displayed their Mini H.M. film plant and Extrusion coating and lamination plant. This company has been able to save much foreign exchange because they have developed these plants with a new technology which was previously imported from USA, Italy, and Germany. Klockner Windsor displayed their blow moulding and injection moulding machinery and thermosetting equipment. The display made by these plastics manufacturers were very interesting and informative. They showed that we can compete with the developed countries in the manufacture of quality products.

A number of seminars and conferences were held as part of the Fair. Some of the subjects discussed were "Relevance of Plastics in the national economy (India with Plastics in 2000 AD)", "Latest trends in plastics materials and applications", "Plastics and energy" and "Plastics exports". Eminent persons connected with the plastics industry participated in these seminars and read thought-provoking papers. Besides several government dignitaries and foreign visitors, the P.M. himself visited the Fair and spent nearly two hours showing considerable interest in the various pavilions specially those connected with the plastics industry.

Business transactions:

The Fair, which concluded on November 29 proved to be an unprecedented success, especially from the point of view of business generated. Some 40,000 serious business visitors are estimated to have visited the Fair and several transactions of far reaching importance has been reported. The public response was also overwhelm-

ing as evident from the record number of persons who visited the Fair in accordance with the Trade Fair Priority of India's Scheme, awards of excellence in display at the Fair were distributed. Bright Brothers Ltd. stood out with the first prize. Supreme Industries took the second prize. Another participant, N. Polymers Ltd. received a commendation certificate. During the Fair a number of important business transactions took place. The Italian Pavilion for example signed three contracts worth nearly Rs. 80 crores for joint manufacture of a variety of plastics such as woodplast and disc containers.

Key Industry:

The plastics industry is one of the fastest developing industries in India. India has become an important potential source for plastic technology and plastics products and also a major market for new products/technologies. Indian plastics industry has registered steady growth over the years. It has emerged as a key industry to many vital industries such as electrical, electronics, defence, agriculture, optics, communications, automobile, storage and building construction. The present investment in all the sectors of the industry, namely, raw material, machinery and processing, is reckoned to be Rs. 2000 crore. The plastics industry is ideally suited for investment in the small-scale sector. There are at present nearly 20,000 small scale units spread all over the country and nearly 90% of them are in the small scale sector. The industry provides employment to more than 10 lakh people. Besides catering to the domestic market, India's plastics industry is netting foreign exchange for the country. Exports were the order of nearly Rs. 73.5 crores in 1986. They are expected to reach Rs. 100 crores by the end of the Seventh Plan. The per capita consumption of plastics in India is a meagre 0.6 kg compared to the world average of 13 kg, Japan 58 kg and Western Europe 63 kg. This shows the enormous way to be made up in catching up with the advanced countries.

Alternative to traditional materials

Today, there is no area of life which the plastics industry

ch. The great significance of lies in the fact that it provides alternative to the traditional and materials such as metals, wood, leather, glass and paper. These are in short supply and expensive and it is only proper these are substituting them. The application of plastics as a substitute for the automobile industry has far implications. The present consumption of plastics in the automobile sector is around 5,000 tonnes and expected to reach 22,000 mts by

Similarly plastics have become integral part in the electric, electro- and telecommunication industries. projected demand of plastics in sectors by 1990 would be nearly 10 tonnes.

Energy Saving:

Besides saving metals, plastics industry also saves energy. It has been convincingly proved that the power required in the production in processing plastics is far lower than that used for other materials. A specific case related to milk pouches. Studies made indicate that in 1984-85, 12,000 tonnes of LDPE milk pouches have been produced to contain 6.5 million litres of milk per day resulting in energy saving during the period equivalent to electrical consumption of nearly 1.1 million families in the villages. Similarly energy input cost in the production of PVC pipes as compared to metal pipes found to be far less. An annexure attached shows the energy requirements of various materials vis-a-vis plastics.

Woven Sack Industry:

The use of plastics in building and construction of houses particularly in floor applications such as window frames is rapidly reducing our dependence on wood, an expensive source. Another significant area in which plastics has been put to fruitful use is in irrigation and water distribution. Plastic bags are now being increasingly used in packing agro-based and industrial products like fertilisers and cereals. It is an accepted fact that jute bags have become obsolete besides being expensive. However, due to political considerations, decisions are often taken to put constraints in the production of plastics sacks and throttle

the growth of the woven sack industry. Even while the Government is urging the industry to adopt new technology it is putting the clock back by causing a setback to the progress of the industry which is advancing technologically for the sake of promoting other interests. Obviously there should be a long term policy governing the growth of the industry instead of subjecting it to frequent changes.

Government has done the right thing by its decision to set up seven more petrochemical complexes. Government should allow these units to produce the raw materials required by the plastics industry. This will help in stepping up indigenous production of plastics goods resulting in competitive prices and high quality. The present consumption of plastics is around 6.5 lakh tonnes. It is envisaged that by 2000 A.D. our requirement will go up to 2.5 million tonnes.

The major negotiative point in the growth of the plastics processing ind-

ustry is the price and availability of plastics raw materials. This limits consumption of plastics even in areas where it is beneficial. In order to encourage use of plastics in agriculture as well as in the industrial sectors it is necessary to review the levies and taxes on raw materials and finished goods so as to generate more demand and thus further increase production. This point has been emphasised by the Apex Committee on perspective planning for the petrochemical industry. It is to be hoped that the Government will implement the various recommendations made by the Committee to foster the growth of the plastics industry and help it play its legitimate role in the national economy.

At the Plastics India '87 Exhibition we, in industry tried to jointly project the best image of the industry setting aside the numerous problems we have been facing. We anticipate therefore a positive response from the Government to the recommendations made by the Association for fostering the growth of the industry."

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Biotechnology & Life Sciences (Part 1)

PROGRAMME ON BIOETHICS BIOTECHNOLOGY MAKES A BUT IN USA

A four year \$1,00,000 programme titled 'Bioethics in Biotechnology' has been set up by Iowa State University (America). The programme will focus on such topics as the use of growth hormones in agriculture and the long-range ethical implications of biotechnology. The school's programme will be represented by departments of molecular biology, biochemistry and other sciences, as well as economics, history, philosophy, political science, psychology and sociology-anthropology.

Members of the Iowa legislature and other state agencies also will participate. The programme is headed by Daniel J. Zaffarnao, the university's Vice-President for research. (*Chem. Wk.* 6/17/87, p. 34).

UNVEILS BIODEGRADABLE ASTIC

At the recent symposium organized by the Society of Plastics Industry (USA) at Washington DC, ICI (Imperial Chemical Industries) unveiled a truly biodegradable plastic. The new biotech product is a durable plastic made from glucose and molasses. The material is derived from bacterial aliphatic polyesters. Reports D. Roger Lloyd of ICI (America); business manager for biological products.

It has long been known, Lloyd reports, that many bacteria and fungi can accumulate a polyester polymer in the form of discrete gran-

nules within a cell. But it was the discovery that the composition of the polymer could be influenced through the nutrition of the organism that provided the requisite breakthrough. An article made from the polymer is placed in soil, the natural microorganism population recognizes it as food. Fungi in particular, colonize the surface and secrete enzymes that digest the polymer. (*Chem. Wk.*, 6/17/87, p. 17).

ENZYME MATRIX FROM CHICKEN BONES IMPROVES CHEESE MAKING PROCESS

Waste chicken bones could soon be improving the cheese making process. This will provide a good outlet for waste chicken bones from poultry industry. Canadian companies have developed a process to make an inert bone matrix from chicken bones. This bone matrix has the unique property to hold bacteria and enzymes needed to make food products, such as cheese.

The matrix is called 'Biobone'. It was developed by Bioprotein Canada, Canada's National Research Council and the University of Guelph. In cheese-making, renin is the enzyme needed to start the process that turns milk into cheese. It is expensive and can usually be used only once by pouring it into a vat of milk. Because natural renin is in short supply, some cheese-makers use a fungal enzyme, which can give the cheese an unpleasant flavour.

If the Biobone is placed in an enzyme wash containing renin, the renin fixes in the porous bone. Milk is pumped through the Biobone

matrix to start the cheese-making process, leaving the renin behind to be used again. Tests at the University of Guelph show that the enzyme will adhere naturally to the bone structure. This fixation of enzyme will make possible substantial economy in the cheese making process by reducing enzyme costs. (*New Sci.* 9/24/87 p. 34).

JAPANESE BI-MONTHLY -- BIOMART TNS NEWS -- ON BIOTECH PATENTS BEGINS PUBLICATION

Tenos Technical Development Institute Corporation -- a Tokyo based venture corporation has begun publishing a bi-monthly under the title 'Biomart -- TNS News'. This publication will cover biotechnology patents having considerable commercial potentialities, which are categorized into seven arenas (drugs, food, fermentation, etc.).

Biomart-TNS News is published on 1st and 15th of each month and will contain 12 A-4 sized pages. The subscription rate stands at 46,000 yen a year. The bi-monthly comprises: (1) New bio-watching covering introduction to new biotechnology; (2) R & D work of private businesses (application for patents on promising biotechnology); (3) Line-up of new products and technology with related comments included; (4) Patent numbers. (*Japan Chem. Wk.* 2/19/87, p. 3).

DESERT SEED BANKS ESSENTIAL FOR THIRD WORLD COUNTRIES

In recent years American seed banks have stored more wheat

varieties that were identified and collected in nearly sixteen developing countries. Nearly 14 countries belong to third world, who have none of their own native materials in storage. The developed countries not only have established gene banks but also heavily controlled the international network of germplasm collection and storage. Consequently, developing countries have to pay for obtaining their native seeds from them. Therefore, for a country like India, there is a great need for maintaining seed banks. A desert seed bank is all the more essential. The desert vegetation is sparse, most of the species there have undergone adaptation at every stage of their life cycle for successful survival and multiplication of race. The natural method of multiplication, which takes place through seeds is the most favourable and perfect method among higher plants.

In recent years awareness has come in India about seed banks (also called gene banks, germplasm banks). A seed bank is a place where all viable seeds are collected, catalogued and preserved for future use. This also provides a panoramic view of seeds of the area well in advance to a beginner in seed work. In fact, what we have inherited from the past generations to the present in the form of invaluable living materials is preserved in seed banks.

The Plant Ecology Laboratory at the University of Jodhpur has a good amount of collection of seeds of various desert plant species. Here a total of 170 species of desert seeds have been preserved. The oldest seeds are of *Euphorbia Caducifolia* and *Cuscuta hysline* (1965). The main collection of this bank are the seeds of *E. Caducifolia* (48 samples). This is a common tree like plant of rocky habitat. Other seed collections are of *Ipomoea pestigris* (22 samples). The National Bureau of

Plant Genetic Resources presently housed in IARI campus is also collecting seeds and world germplasm for national use.

Due to lack of seed banks many third world countries have been facing genetic erosion. Varieties of germplasm should be preserved in the country of their origin before they are sent outside to the international network of germplasm collection.

Many third world countries realized the significance of storing germplasm only after they started facing genetic erosion, particularly in their arid regions. Incidentally, genetic erosion is particularly prevalent at the fastest rate in desert regions of the world.

INTERNATIONAL DATA BASE ON PROTEIN INFORMATION ON THE HORIZON

The Japan International Protein Information Data Base (JPID) headquartered in the Biological Sciences Laboratory of Tokyo at Kashiwa, is making a strenuous effort to compile a data base on protein information on a worldwide scale in cooperation with America's NBRF and West Germany's Max Planck Institute. This programme is in spirit of 'establishment of complementary data banks which do not duplicate one another', as recommended in 1985 by the 'Working Committee on Coordination of Protein Data Banks, set up within the Standing Committee on Science (CODATA) International Scientific United Conference and is aimed at being in the vanguard of promotion on the international level of research in protein engineering.

It is also approaching Australia, India, China and other Asian countries in order to put several countries in step with one another. (*Japan Chem. Wk.*, 10/15/87, p. 8).

BACTERIAL BLENDS CLEAN CYANIDES

British scientists are developing a cheap, foolproof method to deal with wastes containing cyanide by converting them into organic molecules. The method relies on bacteria that convert cyanides -- which are in the form of chemical compounds called nitriles -- into less harmful by-products such as carbon dioxide and ammonia.

Normally chemical companies dispose off nitriles -- byproducts of the manufacture of some plastics -- by destroying them with heavy chemicals, but this is expensive. Otherwise they bury the waste in the ground or dispose of them at sea. Burying or sea disposal, however, does not destroy the toxic materials. Nitriles are potentially as dangerous as organic cyanides. They disrupt biological systems and interfere with respiration in mammals and plants.

Researchers Chris Knowles and Jerry Wyatt from the University of Kent are developing 'custom blends' of bacteria that destroy nitriles much more cheaply and cleanly than conventional treatments. They tackle wastes that was thought to be beyond the powers of bacterial degradation, such as those from orthodox sewage works.

The researchers have a 'library' of some 100 bacteria that can be blended in different combinations to treat different nitrile wastes.

The bacteria contain enzymes that convert the toxic wastes into harmless materials. Ordinary sewage works that rely on bacteria in sludge to detoxify waste can be overwhelmed by the effluent from many chemical processes such as the production of acrylonitrile. This is a starting material from which polyacrylamides are made to be turned into

y of plastics, for foams, cloth-
c.

owles and colleagues have
dy won acclaim for finding bio-
al systems that detoxify cyan-
that foul inorganic wastes, such
ose from steel manufacture or
manufacture of cyanide com-
nds themselves for chemical
essing. The system already
sed by the Kent team to a
nical company in the USA is the
that tackles organic cyanides, or
es, by biological action. (*New*
5/4/87, p. 37).

UPDATE ON GOLD BIOTECH PROCESS

biotech process that uses bac-
a (*Thiobacillus ferro-oxidans*) to
over gold from ore will probably
ome commercial within 2 years,
ording to the developer, Giant
Resources Ltd. (Burnaby, B.C.,
nada).

a successful test that ended last
7, a demonstration plant at Giant
oKnife Mines Ltd., a Sakmita mill
cessed 400 tonnes of ore, recov-
g 95.6% of the available gold,
orts Giant Bay president Claus
sen. Using cyanide alone, the
npany had been able to reclaim
y 65-70% of the metal.

The first commercial plant could
at Salmita, although Giant Bay
s also plans to commercialize a
ge ore body in Nevada, USA,
ere it has acquired a 50% inter-
In addition the company has
it venture mining or licensing
reements for use of the process
h three firms Hecla Mining Co.,
ho, USA, Belmoral Resources
Perth, Australia and Levon
sources Ltd., Vancouver, Canada
d any one of these could result in
mmercial projects. The Nevada
ebody (called the 'Hilop Prop-
y'), is reported to have 10 million

tones of ore containing 700,000 oz
of gold. These are highly refractory.

With direct cyanide leaching, only
5-20% recovery of gold has been
reported, but when pretreated with
bacteria, the investigators got well in
excess of 90% of the gold. With gold
ruling at \$450/oz, it looks very pro-
mising.

A study done for Giant Bay by
Wright Engineers Ltd. (Vancouver)
for 1000 ton/day plant indicates that
bioleaching would be more econom-
ical than wasting or pressure oxida-
tion -- two alternative methods of
treating refractory ore prior to cyan-
idation. Wright's study which covers
the whole process (including crush-
ing and grinding), developed cost
estimates for two sites: Salmita and
a hypothetical location in north cen-
tral Nevada.

In the latter place, capital costs
would be \$23.1 million for bioleach,
\$26.2 million for wasting and \$33.9
million for pressure oxidation. Oper-
ating expenses per ton of ore has
been estimated at around \$18.67 for
bioleach, \$19.42 for wasting and
\$20.31 for pressure oxidation. At
Salmita, capital costs has been
estimated at \$23.1 million for bio-
leach, \$26.25 million for wasting and
\$35.3 million for pressure oxidation,
with respective operation outlays of
\$31.85/ton, \$37.37/ton and
\$32.64/ton.

Gold recovery with pressure
leaching is normally similar to that
obtained via bioleaching, while
roasting usually yields somewhat
less, according to reports from Giant
Bay. One potential drawback of bio-
leaching is that the bacteria work at
a pH of 2 in an air sparged tank, but
the ore slurry must be brought up to
a pH of 10 for the cyanidation step.

Neutralization is one of the major
expense, although the actual cost

depends on the availability of lime-
stone or lime. To reduce the
expense, the Company intends to
test the use of waste ore as an
intermediate neutralising agent, fol-
lowed by lime or limestone treatment
to raise the pH.

Giant Bay Co. has applied for US
patent on the bacterial leach tech-
nique, as well as on the use of T.
ferro-oxidans to treat gold ores that
contain carbon impurities. Carbon is
a problem because it tends to
absorb gold and silver cyanide com-
plexes during the cyanide leach -- a
phenomenon known as 'preg-
robbing'. This makes it difficult to
separate the metals from the ore,
and can reduce recoveries to less
than 5% reports company's techni-
cians.

Probably 5-10% of the world's
deposits contain carbon and it is very
expensive to treat them because the
cyanide consumption is astronomi-
cal.

Giant Bay's process for carbon-
containing ores uses specially
adapted bacteria. The developers do
not exactly know what happens, but
the carbon is essentially inactivated.
The method has been piloted at the
0.1 ton/day scale in 200 litre tanks.
(*Chem. Eng.* 10/12/87 pp 29-30),
(*Chem. Eng.* 7/20/87 p. 9).

A PILOT-SCALE PEPTIDE PRODUCTION PLANNED BY SOLVAY (BELGIUM)

Belgium's Solvay has planned a
subsidiary Peptisyntha, which will
produce peptides in a Brussels pilot
plant that is due to come on line at
the end of 1988. Peptisyntha will use
a manufacturing process developed
by Solvay researchers working with
scientists at Rijksunisiteit of Ghent
and the Central Laboratory of
Neder-Over-Heembeek. (*Chem.*
Wk., 10/7/87, p.20).

BIOTECHNOLOGY INCORPORATED AS A NEW GROUP IN DGTD TECHNOLOGY ADVISORY GROUPS

DGTD (Directorate General of Technical Development) of the Government of India has set up Technology Advisory Groups in selected sectors of industry and one of the groups is on 'Fermentation Technology and Industrial Applications of Biotechnology'. The main objectives of these Groups is to identify the technology gaps and suggest action plans to bridge the same.

The Group on Biotechnology is presently in the process of formulating its recommendations. Therefore, biotechnologists, instrument and equipment manufacturers and associations should send their recommendation.

BIOTECHNOLOGY DESTINED TO PLAY A KEY ROLE IN WORLD AGRICULTURE

Biotechnology will play a key role in solving world's hunger. This role of biotechnology was highlighted at the recent American Society for Microbiology Conference on Biotechnology in San Diego, California.

Plant breeding has already provided plants with resistance to major diseases to some insect pests and with enhanced yields. Today, genetic engineers have the tools to enhance significantly the efficiency of agricultural production and make farming a more reliable and profitable business.

According to Dr. Howard A. Schneiderman, Senior Vice-President of Monsanto, American agriculture can greatly benefit from biotechnology. It can enable American farmer to significantly lower the input costs, improve crop quality and

at the same time enhance the quality of the environment. If we cannot use tools like biotechnology to enhance the agricultural productivity, the pressure on land (particularly in tropical lands) will increase. Deforestation will continue with profound consequences for the productivity and health of the planet.

Ultimately from the point of view, using biotechnology to control plant pests and to raise the agricultural productivity of the areas already under cultivation may be the best way to leave other parts of the world unaltered.

Another attractive way to improve the efficiency of agricultural production worldwide is the use of genetically engineered microorganisms to replace many crop chemicals and extend the range of certain crops.

Besides improving the productivity of existing agricultural lands, gen-

etic engineers are also learning to make foods of higher quality --better taste, better shelf-life, better processability and more nutritious. (CMR, 7/6/87 pp 5, 23).

A NEW PATENT ON DEVELOPMENT OF IMPROVED CROPS FROM TISSUE CULTURE

Sugngene Technologies Corporation has been granted a patent covering its process to develop a variety of agronomically improved cereal crop from tissue culture. Company refers to its patented process as 'a direct and more simple way to generate superior crops'.

This patent encompasses reproduction of barley, corn, wheat, sorghum and rice, rather than the expensive technology which requires a series of different measures for each crop. (CMR, 6/1/87 p. 47)

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Chemical Plant Developments

JAMES LOCK

Consultant Editor, 'Processing' London

CROPROCESSOR -- ONTROLLED WATER MONITOR

Kent Industrial Measurements Ltd. Stonehouse, Western England, has introduced a self-checking, microprocessor-based water quality monitor that operates at an unmanned site for long periods without needing any attention.

The monitor, model 7975, simultaneously measures up to six different parameters. These are water temperature, pH, conductivity, dissolved oxygen, turbidity and air temperature if required, with high and low alarm set points for each of the six channels. All this data plus other information can be automatically relayed to a central station via telemetry, landline or fed into a local data logger.

The equipment has been designed on the experience gained with the well established model 7972 water quality monitor and has an electronics section built in a 480 mm rack format incorporating some of Kent's System 19 modules for the measurement of temperature, pH and conductivity. For the 7975, the firm has also designed new modules for the measurement of dissolved oxygen and suspended solids, plus the new six channel alarm display and a switch mode power supply.

By using microprocessor technology the monitor offers automatic two-point checking of the pH measuring system at 4 and 9 pH, and automatic checking of the dissolved oxygen cell in air, plus automatic biocide cleaning of the entire system, all at user-selectable inter-

vals. Frequent checking of the nephelometric turbidity sensor, multi-electrode conductivity sensor and PT100 temperature sensors is not necessary.

Automatic Functions

To minimise running costs the monitor can be programmed to provide a discontinuous sampling mode with a choice of frequency and duration of sampling, in addition to continuous monitoring.

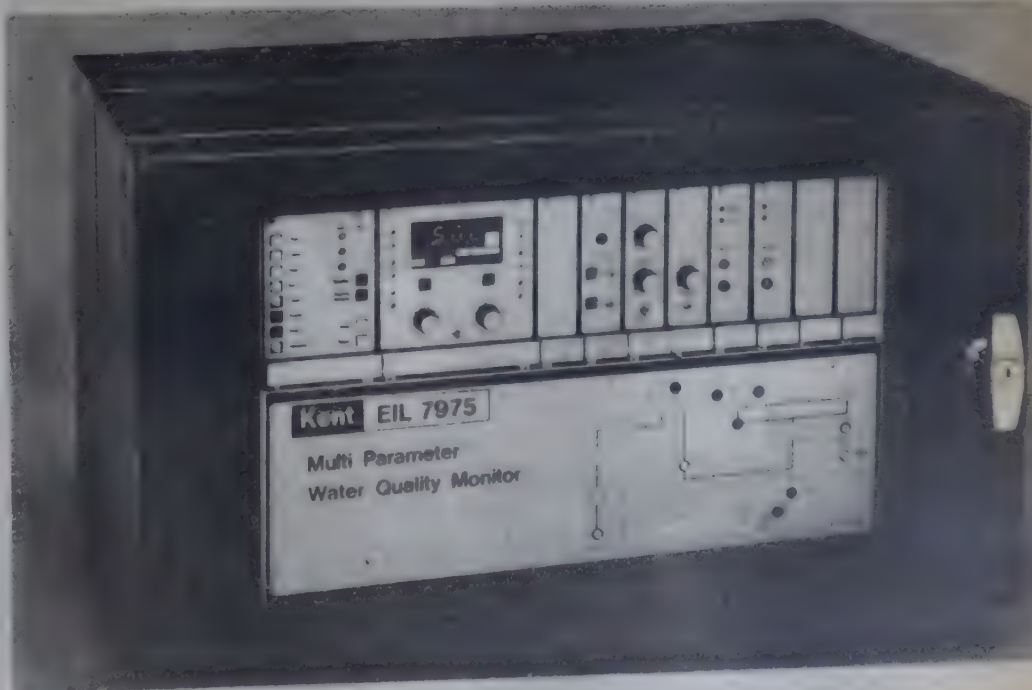
The microprocessor-based timer controller at the heart of the new equipment is in command of all of the automatic functions of the monitor:

- * Periodic sampling.
- * Automatic two-point checking of the pH probe.
- * Automatic air checking of the dissolved oxygen probe.
- * Automatic biocide cleaning.

Fitted into the electronics case below the modular racking system is a mimic diagram that shows the operator information at a glance of sample pump status, low sample level in header tank, status of the solenoid valves of the main analysis panel and low biocide level.

The whole of the electronics section is contained within a case consisting of a lockable door allowing access to the front panel controls of the electronics modules and an inner hinged section behind which are mounted the customer connection terminal blocks and connectors for the liquid handling panel.

The liquid handling section of the monitor comprises two wall-mounted panels, the first being the turbidity and water temperature panel. The second is the main analysis panel which carries the pH system, the dissolved oxygen system and the conductivity flow cell, together with



Kent's self-checking microprocessor-controlled water quality monitor measures up to six different parameters simultaneously.

a constant head tank and electronically controlled valves for the automatic cleaning and checking of the systems.

For further details, contact: Kent Industrial Measurements Ltd., Oldends Lane, Stonehouse, Gloucestershire, United Kingdom, GL10 3TA.

PORTABLE FLANGE FACERS

Furmanite International Ltd. of Kendal, northwest England, makes a range of three portable machine tools for the facing, turning, grooving and weld preparation of flanges from 0 mm to 1524 mm, based on the company's detailed knowledge of site operations. Furmanite has been manufacturing portable machine tools for many years for use by the company's own on-site machining division. The equipment incorporates many features which make it possible for it to be used in the optimum number of locations with ease of operation.

The AX 012 and AX 630 can be lifted by one man and the AX 2460 requires only minimal lifting equip-

ments. Besides being light, they are strong and rigid and will provide machine shop finishes on site. Each machine is self-supporting, requiring no temporary fixings and will resurface from the internal diameter to the extreme outer edge of the flange. It can also be used in the horizontal, vertical or overhead position.

The AX 012 is set up by fitting the base ring assembly on to the flange to be machined, and then setting the adjustable clamp blocks to within 12 mm of the outside diameter. The rest of the machine can then be quickly assembled.

The AX 630 and AX 2460 are both internally mounted. Setting them up involves the installation of the base assembly into the bore of the flange and then screwing the adjustable clamps to the correct diameter to hold it in place. Each machine can be clocked at this stage, after which the rest can be quickly assembled. A significant feature is the small amount of clamping surface required. The AX 630 requires only 64 mm and the AX 2460 only 153 mm of depth from the face of the flange.

The machines are fitted with specially designed pneumatic motors that provide plenty of torque and allow them to be used in hazardous areas. They have been designed to give the exact surface finish required.

Other areas of application concern the heat exchanger. The AX 2460 can also be fitted with an attachment to machine the back face of tube bundles, boiler manholes, cover joints, distillation columns and so on. Each machine is supplied packed in its own purpose-built box.

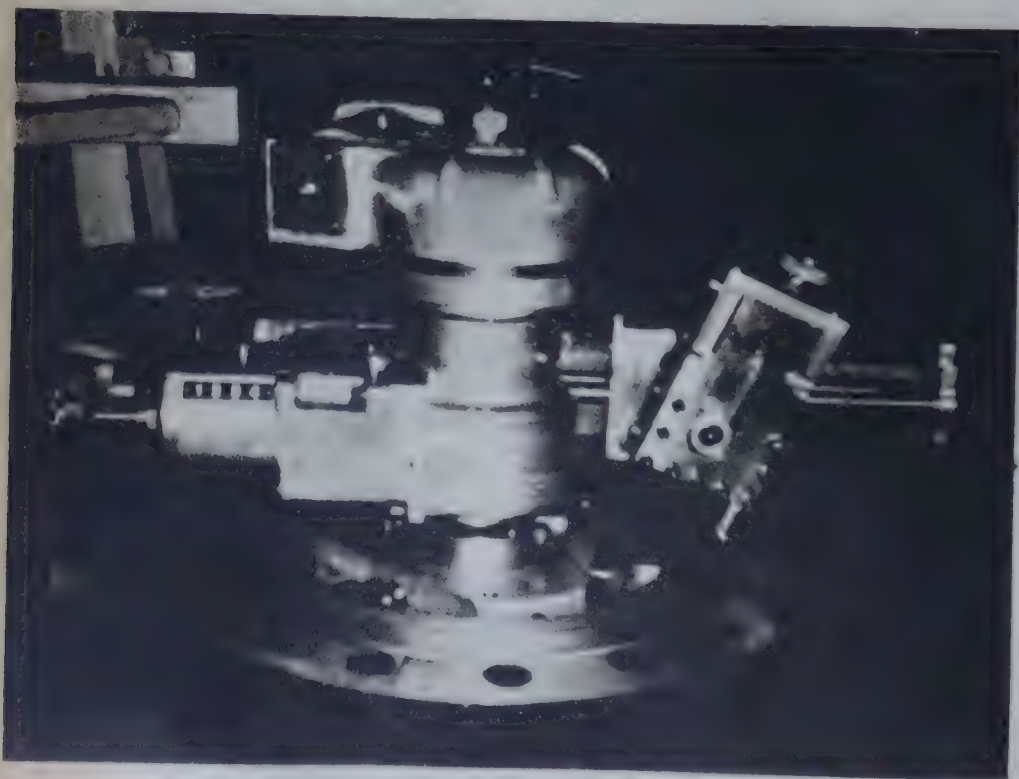
For further details, contact: Furmanite International Ltd., Furmanite House, Shap Road, Kendal, Cumbria, United Kingdom, LA9 6RU.

MASS FLOW COMPUTER

The Protech Supervue Model PA04, made by Protech Instruments & Systems Ltd. of Luton, north Bedfordshire, is designed to provide high speed microprocessor-based computing accuracy for the calculation of mass flow on up to four loops in a single enclosure. Each mass flow loop provides corrected outputs for both instantaneous and totalised mass flow using standard computing algorithms and field transmitter inputs for the flow variables.

The field signals for primary flow inputs may be either analogue or pulse signals derived from differential pressure transmitters, linearised differential pressure transmitters, vortex meters, turbine meters or any other type of flow measuring device providing a signal to instrumentation.

The PA04 is also able to accommodate density input signals, for example, density inversely proportional to frequency with high zero offset, where required although the use of standard temperature and pressure compensation technique is also catered for. Density meter



Furmanite's AX 630 portable flange facer.



The Protech Supervue mass flow computer

required for fluid flows when the composition may change directly.

The PA04 provides, within its standard software package, for the user to set all the relevant process constants. The integral keypad, securely interlocked by key, allows for engineering parameter changes to be made and the different display modes to be changed. Default values are also included to take over in the event of transducer failure.

The calculation and variable parameters are all retained in the microprocessor memory and protected from loss in the event of the power supply input being interrupted, by use of battery-backed random access memory.

In addition to the mass flow calculations, options are available whereby alarms can be included to indicate failures in primary devices and outputs are provided for "out of range" indications on each loop. An RS-232-based interface to printer, computer or telemetry equipment can be provided.

For further details, contact: Protech Instruments & Systems Ltd., 41, Selbourne Road, Luton, Bedfordshire, United Kingdom, LU4 1NP.

CLOSED CIRCUIT COOLING TOWERS

The Series FCA is a new range of closed circuit cooling towers, designed by Heenan-Marley Cooling Towers Ltd. of Worcester, western England, for use in both air conditioning and industrial process applications.

According to the firm this range of 30 closed circuit cooling towers, covering nominal duties from 4.6 tonnes to 341 tonnes refrigeration (20 kW to 1480 kW) offers an economic means for recycling cooling water or process fluids free from any external contamination.

By combining the functions of a heat exchanger and an open circuit water cooling tower the Series FCA simplifies equipment sourcing, reduces installation costs and provides an efficient method for recycling process cooling fluids. Air forced over the serpentine coils in the heat exchanger while they are subjected to a continuous water spray, maximises the cooling effect on the fluid within the tubes.

This method for removing sensible and latent heat enables the towers to cool water to within 3°C of the wet bulb temperature offering a clear

advantage over an air-cooled system that can cool to within 3°C of the higher ambient air temperature.

These towers are designed to be practically free from vibration and can be mounted directly on to a prepared foundation or supporting steelwork. Where even minimal vibration is unacceptable, anti-vibration rails with spring isolators can be supplied to provide at least 95% isolation efficiency with full fan speed. Careful attention has been paid to the need for access for maintenance and corrosion resistance.

Galvanising of mill galvanised sheet to G600 as defined in BS 2989 and for other hot dipped galvanised steel components to BS 729 Part 1 is specified. To counter extreme corrosion, tower casings can be manufactured in either 304 or 316 grades of stainless steel. Similarly, where local conditions or the nature of the fluid to be cooled demands, the heat



The Heenan-Marley Series FCA closed circuit cooling tower can return water 8°C to 10°C cooler than an air blast cooler in summer conditions.

exchanger coils can be manufactured in either 304 or 316 stainless steel.

For further details, contact: Heenan-Marley Cooling Towers Ltd., P.O. Box 20, Pheasant Street, Worcester, United Kingdom, WR1 2DX.

COMPUTER CONTROL OF FERMENTATION

BIO-i and BIO-pc are two software packages developed by Biotechnology Computer Systems, in collaboration with the Department of Chemical and Biochemical Engineering at University College, London, for the control of fermentation systems. The work was part of an ongoing pooling of effort designed to combine the skills of software and process experts.

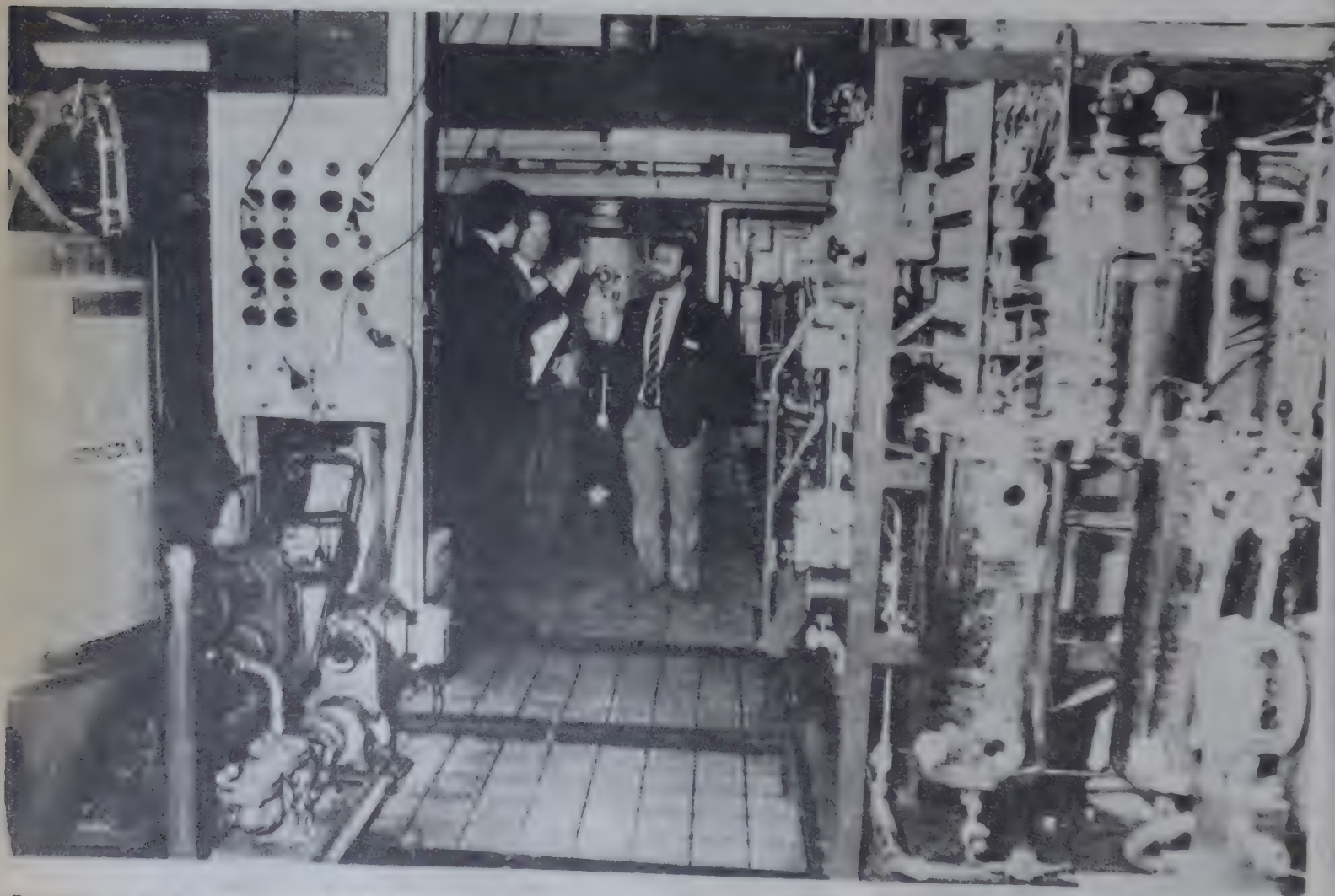
BIO-i is a single comprehensive fermentation management system, developed to satisfy the differing needs of the fermentation plant engineer and worker, and the research scientist. It has been configured as a supervisory system in which distributed digital controllers associated with each fermenter are linked to the process computer. Designed for use with the digital systems Equipment range of computers, the package employs well proven systems software programming languages and real-time process plant databases. Mass spectrometer data is used in the monitoring of off-gases.

The distributed nature of the system and the ease with which it can be configured means that new fermenters, sensors and analytical equipment are simply incorporated

when they become available. The system has been developed on an extensive range of fermenters and reactors in the pilot plant. From the results of the collaborative programme, such as the current work on adaptive control, can be added to the package as they become available.

BIO-pc is configured as an IBM AT or compatible computer, with monitors and other peripherals, and uses the standard MS-DOS 3.0 operating system. Its software includes a complete professional Smart applications package. A feature of this is the spreadsheet with graphics that can be used while the computer is data monitoring and logging the plant.

University College London is one of the national centres for biotec



Distributed digital controllers are associated with each fermenter, and linked to a central computer in the University College London pilot plant.

designated through the United Kingdom's Science and Engineering Research Council (SRC) and has wide research links with industry. Biotechnology Computer Systems is a member of the British International Group of biotechnology companies which operate worldwide.

For further details, contact: Biotechnology Computer Systems Ltd., 100 Strand House, Church Path, Church Green, Chiswick, London, United Kingdom W4 5HR, or Department of Chemical and Biological Engineering, University College London, Gower Street, London, United Kingdom WC1E 6BT.



The new Maggy pump from Totton Pumps Ltd. offers higher performance and reliability.

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Designed and manufactured by Totton Pumps, the Maggy is a centrifugal pump designed originally for dispersing liquids. It is capable of operating to four outlets without loss of performance, maintaining the pressure (3.1×10^{-3} Pa for a flow of $5 \text{ m}^3/\text{min}$) with only slight fall-off above this flow rate.

This magnetically coupled pump is hygienic construction with no shaft seals or motor brushes to wear and designed for low maintenance and extended life. With magnetic drive without glands or seals; it is leak

robust construction with encapsulated magnets and fittings in polished, food grade, polyester or polypropylene ensures completely hygienic operation.

The pump has a bleed valve in stainless steel and is fitted with a double O ring. It has a non-return valve integral in the outlet and the pump bearings are ceramic/ceramic. The motor is of the permanent split-capacitor induction type with

integral sealed gear drive running on 240 V or 110 V single phase 50 Hz power supply. Output is 250 W and pump enclosure is to IP 54. Weight is 8.5 kg.

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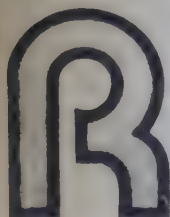
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Chemical News from Abroad

NTEDISON, OXY LINK IN BN USSR JOINT VENTURE

Italy's Montedison and Occidental Petroleum Corp of the US to participate in a major petrochemicals joint venture in the Soviet Union. The two groups, pioneers in the field of co-operation with the USSR, have signed a memorandum with the Soviet ministry of oil industries stating their intention to develop and operate a petrochemical complex at Tengiz near the Caspian Sea. The complex will utilize the gas liquids and sulphur produced at the Tengiz oil fields. The Soviet ministry of oil industries is headed by minister V. A. Inkov.

Announcing the plan in Moscow, Dr. Armand Hammer, chairman and chief executive officer of Occidental, said that the project will require total investment of \$5-6bn. When completed, the joint venture will be the largest ever created in the Soviet Union and one of the largest petrochemical complexes in the world, he said. "The implementation of this joint venture will combine the great natural resources of the Soviet Union with Western technology, thereby making the benefit of these products available to all of the world," Dr. Hammer said.

Marubeni Corp. of Japan has agreed to join the international consortium which may involve two or three other companies. Construction work is scheduled to begin in 1989 and the complex should begin production three to four years later.

Montedison, which has been chosen to head the group, will by the end of January set up the consortium to build the plants. A

technical study, which is expected to take about a year, will begin following approval of the consortium by the Soviet authorities.

Using ethane and gas condensate the complex will produce between 900,000-1m ton/year of ethylene, 500,000 ton/year of polyethylene, 500,000 ton/year of polypropylene, other types of polymer, copolymer and composites and 1m ton/year of commercial-grade sulphur. Other petrochemical derivatives, which are to be defined by the study, will also be included.

Also located at the complex will be facilities for the production of finished products such as pipes and pipe unions for normal and high pressure conditions for use in the oil and gas industry; insulation films for pipe and general insulation, structural articles; nonwoven textiles and pure sulphur for fertilizers.

The Western partners, which will hold 49 per cent in the venture, have agreed that at least 50 per cent of the commercial products produced at the complex will be sold on the world market.

Tengiz is one of ten new ethylene-based petrochemical complexes planned in the Soviet Union. By using the gas fraction the Soviet Union would valorize by-products which are currently in surplus and not fully utilized. Using the feedstock would also require lower construction costs for the cracker, compared with heavier fractions.

Himont, the polypropylene subsidiary of Montedison, will provide technology for the PP unit. Tecnimont, Montedison's engineering arm, which has built

over 50 chemical plants in the USSR, will act as contractor.

The polyethylene process has not yet been selected but Union Carbide Corp, which has delivered a number of PE plants to the USSR, is in with a good chance.

Finance will come from Italy, Japan and Europe. Montedison will form the consortium of banks to provide the finance. Tecnimont and Marubeni will take responsibility for engineering, procurement and construction. Marketing will be handled by Montedison, Occidental and Marubeni.

Asked about the problem of possible overcapacity, particularly in Europe, that such joint ventures would create, a Montedison spokesman explained that the memorandum states that all the types and product quantities will be defined by the joint venture on the basis of and in conjunction with the world market.

Tengiz Development	
Product	Capacity '000 ton/year
Tengiz I	
Dry natural gas	634
Ethane	174
Propane	112
C ₄ /C ₅ fraction	184
Stabilized crude oil	3,000
Sulphur	480
Tengiz II	
Dry natural gas	634
Ethane	174
Propane	112
C ₄ /C ₅ fraction	184
Stabilized crude oil	3,000
Sulphur	480
Oxy/Montedison joint venture	
Ethylene	1,000
Polyethylene	500
Polypropylene	500
Sulphur	1,000
Other polymer, copolymer materials, composites	

Montedison, which has a good knowledge of the European market, will co-ordinate the plans and ensure that product flow is carried out in an orderly manner, so that there is nothing to fear, the spokesman added.

The project is part of a long-term plan to raise crude oil production from the Tengiz field to 30m ton by 1995. The first part of the project, which will produce 3m ton/year of crude oil, is already under construction. A consortium comprising Lavalin, Litwin and Lurgi, is currently building Tengiz I. When completed in 1989, Tengiz I will produce 634,000 ton/year of dry natural gas, 174,000 ton/year of propane, 112,000 ton/year of propene, 184,000 ton/year of C_4/C_5 fraction, 3m ton/year of stabilized crude oil and 480,000 ton/year of sulphur.

The foreign trade organization Machinoimport has already issued enquiries for Tengiz II which will double capacity by 1990.

The Oxy/Montedison joint venture project will lead to a further doubling of sulphur capacity at Tengiz to a total of 2m ton/year. Occidental is keen to obtain sulphur for its fertilizer production.

The competition for Tengiz II includes the Lurgi and Litwin consortium, without Lavalin which is now quoting the entire project alone, Mannesmann/Linde, Fluor/C. Itoh. Technip also received the enquiry. Contract awards for Tengiz II are expected shortly because the Soviet Union would like to keep the Hungarian construction teams on the site.

SPANISH INVESTMENT FOR SOLVAY?

Belgium's Solvay is considering an investment of Pta4bn (\$35m) in Spain during 1988. The group, which own 25 subsidiaries in Spain, says the money will be used to diversify its manufacturing activity. Solvay's Spanish sales totalled Pta65bn

in 1986.

At present, Solvay's Spanish activities include production of chloralkalis, peroxides, plastics pharmaceuticals and animal health products. Through its Catalan-based units, Viniclor and Hispavic Industrial, Solvay controls an important share of the domestic VCM and PVC markets. Its Torrolaveaga factory makes sodium products and is the main supplier of caustic soda to Spanish industry.

In a separate move, Solvay has acquired a majority stake in the Italian plastics processor, Calepiovinil. Based in Fucine Di Ossana, Calepiovinil makes PVC film for highly specialized markets.

PPG SELLS POTASH FERTILIZER BUSINESS

PPG industries has completed the sale of its potash business Kalium Chemicals, to Sullivan & Proops. Terms were not disclosed, but the sale includes the ma-

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facturing facility at Belle Plaine, Saskatchewan, Canada, a pot plant in Michigan and related distribution assets in the US. Potash accounted for less than \$100m of PPG's \$4.7bn total sales in 1986.

DSM RESINS UNVEILS MAJOR EXPANSION PLANS

DSM Resins BV, the Zwolle-based resins and coatings division of DSM, has announced major expansion plans and expects to double sales and increase staff levels by 50 per cent over the next five years.

Targeted growth areas are in the unit's compounds and powder coatings businesses and this will be achieved by investment and acquisition, according to Dingemans.

Sales for DSM Resins were \$1.1bn (\$578) in 1986 and these are expected to rise to \$2.2bn by 1993. Staff numbers could rise from 2,500 to 3,500 over the same period.

Dingemans said that around \$600m is being allocated to investments and he announced the first two of these plants in China and West Germany. DSM has just signed a letter of intent with Beijing Paint Red Lion of China to build a jointly-owned production line at Beijing. The new plant will have powder coatings capacity for 1,000 ton/year and is expected on stream in 1989-90.

DSM Resins is also planning to build a powder coatings plant at Reutlingen, West Germany. The new facility, due on stream in 1989, will combine the existing two production sites at Landshut and Reutlingen. The investment, involving "several tens of million guilders," will result in capacity expansion from 6,000 to 10,000 ton/year.

Cash for acquisitions — probably in the US and Far East — will come from DSM Resins and the parent group, which has targeted the resins sector for growth. Profits for the division are expected to rise from Dfl.70m in 1986 to around Dfl. 210m by 1993.

DSM considers itself strong in powder coatings. Dingemans reckons the company's market share in polyester resin-based coatings is about 50 per cent. He sees good growth — 10-15 per cent/year — for powder coatings in several industrial sectors. Dingemans also believes powder coatings' share of the total paint market could rise from current levels of 6-7 per cent to 20 per cent in the 1990s.

At present, DSM produces 15,000 ton/year of powder coat-

ings and sees this rising to 38,000 ton/year by 1993.

KIO MULLS BID FOR CONTROL AT ERT

The Kuwait Investment Office is considering a public offer for ERT shares in an attempt to win a 51 per cent holding in the Spanish chemicals giant. Currently KIO owns a 25 per cent stake in ERT via its subsidiary, Torras Hostench. Acquiring a further 26 per cent could cost KIO up to Pta 20bn (\$175m), according to sources in Madrid.

If the offer goes ahead, and sources say this is dependent on the outcome of negotiations currently in progress with ERT chairman Jose Maria Escondri las, KIO is likely to transfer the stake held in ERT by Torras Cros. Barcelona-based Cros, chemicals and fertilizer group

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controlled by KIO, would they propose a public share swap of one of its own shares for two in ERT.

Meanwhile, KIO is studying a new offer from Escondrillas which could end the Kuwait unit's participation in ERT. In return for KIO's 25 per cent holding in ERT, Escondrillas is proposing to throw some additional assets into the planned Cros-ERT fertilizer joint venture, Fosforico Espanol.

These include ERT's potash mines, Sallent and Cardona; another commercial subsidiary, Traficos y Almacenes; Coposa, a potash marketing unit; and the shipping company, Auxtramarsa. ERT and Cros would also be equal partners in Fosforico rather than Escondrillas' company owning a majority.

While ERT continues to fight the KIO, the group has published

disappointing results for the first nine months of 1987. Profit is down 87 per cent to Pta528m compared with the same period last year, and sales are also down by 11.4 per cent to Pta120bn. The company attributes the poor figures to a delay in this year's fertilizer campaign.

On the plus side, ERT's financial costs fell 29.7 per cent and debt has been reduced to Pta-75bn.

EEC COMMITMENT ON GULF TRADE PACT

The European council has given a clear indication that any future trade agreement with the Gulf states must not damage the community's refinery or petrochemical industries.

At a recent ministerial meeting, the EEC commission was given a mandate to negotiate a

two-tier co-operation agreement with the Gulf co-operation council. Initially, this means a standstill in existing trade relations but allows room for further liberalization in the future. In the first phase, the EEC will offer the GCC political and technical co-operation.

During the second phase, the EEC will discuss trade liberalization, but a European council spokesman said this question would have to be discussed internally before the commission was allowed to proceed with negotiations.

The spokesman emphasized that the European council would ensure that any future agreement does not disrupt the community's petrochemical industry. He said that safeguards for the sector could include "tariffs or restrictions of some kind," but these are a matter for internal settlement.

Tay Knowland, president of the Association of petrochemical producers in Europe (APPE) said the organization is pleased with the outcome of the European council meeting. He added the Gulf states already have the advantage of cheap ethane feed stocks and access to the EEC markets through the generalized system of preferences.

AIR PRODUCTS BUYS STAKE IN ANCHOR

Air Products and Chemicals the US industrial gases and chemicals group, has acquired a 29.5 per cent stake in the UK's Anchor Chemical group and is planning a full bid for the speciality chemicals producer. The stake was acquired from Leski Inc. of the UT for an undisclosed sum.

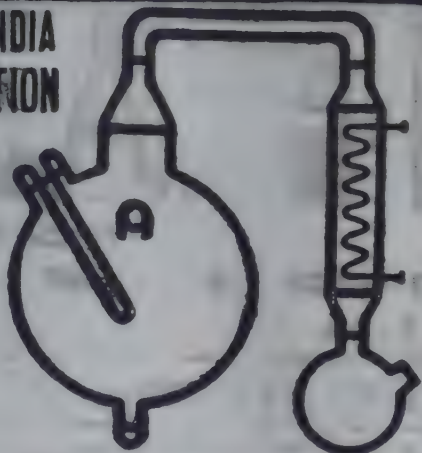
According to Allentown, Pennsylvania-based Air Products, the moves are based on the synergies between the two companies in

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field of epoxy resins, an area US group has targeted for expansion.

Anchor, meanwhile, has described the Air Products' move as "unwelcome." The group is understood to be examining a number of approaches from other companies.

The UK group had sales of £6m in 1986 and recorded tax profits of £1.55m. It has a total of seven operating companies based in the UK, France, Italy, South Africa, Australia and the US. Products include epoxy resins, acrylic resins and curing agents. Anchor's Pacific Anchor Chemical Corp subsidiary is the leading US supplier of epoxy resins.

MOBAY BACKS GROWING POLYCARBONATES IN THE USA

The Mobay Corporation, the subsidiary of Bayer AG, has announced a series of measures aimed at further expanding the company's leading position in polycarbonates on promising new markets in the USA as well. These markets include not only compact discs for music and optical data storage but also extruded products — primarily for food packaging.

At the same time, Mobay announced a name change for the 30 or so polycarbonate grades which have so far been marketed under the trade name Merlon in the USA. From now on, the trademark Makrolon, the name under which Bayer AG, Leverkusen markets these products in virtually all other countries of the world, is to be used in the USA as well.

The uniform designation is intended to make it easier for designers and purchasers to specify the correct grade of Makrolon

and purchase this in different countries, given the increasingly international nature of processing. All the leading manufacturers of business machines, telecommunication equipment and automobiles, for instance, produce complete units or key components at several different locations in different countries at one and the same time. To ensure a uniform supply of raw materials, it is important for the appropriate grade of Makrolon to be precisely defined throughout the world by having the same name and grade designation.

Expanding capacities

To meet the rapid increase in demand for polycarbonate worldwide, Bayer is currently building a new plant in Antwerp, which will be coming into operation in 1989 with an initial capacity of 23,000 t/p.a. This will

be expanded to 46,000 t/p.a. by 1992. At present, Bayer produces some 90,000 t polycarbonate per annum in Europe, and Mobay has a capacity of some 37,000 t in the USA. This gives Bayer a share of approximately 35% in the overall world market for polycarbonate.

Mobay is reckoning on an annual increase in consumption of six to eight per cent in the USA up to 1995. In 1986, consumption was some 155,000 t, corresponding to a value of US \$ 585 million. Consumption should have risen to 225,000 t by the end of the decade.

Mobay is convinced that decisive developments are just around the corner for polycarbonate, which will make it possible to conquer new, significant markets in different sectors of industry. These include transport and traf-

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fic, building, sports equipment, medical products, data storage and packaging. A worldwide demand of some 20,000 t polycarbonate is expected for compact discs — both the music discs and a type of CD-ROM (read-only memory) optical data storage disc. This is without counting the other types of optical data storage discs which are still at the development stage. Bayer and Mobay currently supply some 50% of the polycarbonate used in the production of compact discs for music.

Mobay expects food packaging to take 23,000 t extruded polycarbonate per annum up to 1995 in the USA alone.

Two new laboratories

Two new applications research laboratories were opened at Mobay in June 1987: a compact disc (CD) laboratory and an extrusion laboratory. The CD laboratory has facilities for performing all the operations involved in the manufacture and testing of audio CDs. The laboratory will be concerned primarily with the optimisation of existing polycarbonate formulations, the development of new polymer systems and the development of new processing techniques or the refinement of existing ones. In addition, it will help manufacturers of audio CDs to conquer new markets and successfully maintain these. Particular value will also be placed on technical research into compact discs as optical storage media.

In the USA, sales figures for audio CDs rose to between 48 and 50 million in 1986. In 1984, the figure was only 6 million. Worldwide, some 200 million CDs were sold last year. Demand in the USA is expected to be 350 to 400 million up until 1995; demand worldwide is even

expected to reach the billion mark.

These estimates are based on the rising sales figures for CD players in the USA. In 1986, 2.3 million players were sold, and a 50% increase is expected for 1987. By 1990, some 25 million CD players are expected to be in use in the USA.

Similarly high growth rates have been recorded in optical storage discs since their introduction in 1984. In the first year, less than 5000 polycarbonate CD-ROM discs were produced worldwide. In 1985, the sales figures increased four-fold to 20,000. Sales figures for CD-ROM discs could be as high as 10 million per annum by 1990, in line with the increase in the number of CD-ROM disc drives installed.

Attractive extrusion markets

The new extrusion laboratory has facilities for processing sheet, film, laminate, profile and multilayer products. Work will be focussed chiefly on food packaging, a sector in which concepts currently under development are pointing to new applications for Makrolon. The use of polycarbonate in food packaging is expected to increase, particularly for hot-filled, sterilisation-resistant packs that are suitable for microwave ovens.

In Mobay's opinion, this hot-filled packaging will be used primarily for juices, desserts, jam, sauces, tomato-based products and sports drinks. The chief users of the sterilisation-resistant packs will probably be infant and baby food manufacturers.

As part of its development work, Mobay is currently introducing a new polycarbonate, Makrolon DFL-1073, which is especially suitable for coextruded food packaging. This material has a wide processing range,

making it easier to use heat-sensitive barrier layer materials.

Further development, particularly relating to extrusion applications in the automotive industry, transport and traffic, building, sports equipment, lighting and medicine are also to be carried out in this laboratory in future.

Setting up this laboratory was the logical reaction to the potential that Mobay sees in extrusion, given the high growth rate in extruded products. Some 30 to 40% of overall polycarbonate consumption in the USA — some 50,000 tons — is produced by extrusion, and major applications are opening up a large number of market segments, so that extrusion deserves increasing attention and support.

The heart of the new laboratory is a universal extrusion plant which can be used to produce high-quality surface-treated and sheet in thicknesses of μm to 12.5 mm and in width up to 75 cm. This plant is signed for maximum flexibility and was purpose-built to Mobay specifications.

REPSOL TO ACQUIRE CARBESA

Spain's Repsol Quimica is expected to acquire the Carbesa carbon black business from the Spanish oil, gas and petrochemical group, Cepsa. The deal has been agreed in principle but is awaiting final approval from the boards of both Repsol and Cepsa. A Repsol spokesman said that reports that the deal is worth Ptas. (\$26m) are incorrect.

Repsol Quimica operates a 40,000 ton/year plant at San Sadre in the north and Carbesa a 20,000 ton/year facility at Roque on the south coast.

Chemical Markets Abroad

ACETIC ACID SHORTAGE TO IMPACT EUROPE

In the wake of the explosion and fire on November 14 at the 1000 ton/year Hoechst-Celanese acetic acid plant in Pampa, Texas, the company has declared a *force majeure* on all its contracts. According to officials at the unit, customers have been put on an immediate 60 per cent allocation for acetic acid, though adjustments to this are expected in the near term.

Loss of production at the site, which Hoechst-Celanese expects to be offstream for an indefinite period, will tighten the already stretched acetic acid and acetic anhydride market in the near and knock-on effects are expected in Europe in the new year. Market sources suggest the plant represented some 5 per cent of the world's total acetic acid production capacity and about one-third of the organization's product was manufactured there.

In part from the products mentioned, output of all others from the plant has been affected. These include: ethyl acetate, methyl ethyl ketone, methyl acrylate, 2-ethyl hexyl acrylate, formic acid, methyl formate, propionic acid and butyric acid.

Hoechst in West Germany produces 145,000 ton/year and 1000 ton/year of acetic acid at Frankfurt and Knapsack respectively. The company said, it has "no excess capacity" to spare. But a spokesman emphasized that it would be doing everything it could to help US production, while safeguarding the supply interests of its own customers in Europe.

The company's acetic acid is primarily used to make vinyl acetate (VA) for paints and adhesi-

ves. Before the explosion VA was exported from Hoechst-Celanese in "substantial amounts" to supplement derivative production. As VA output from Pampa has been affected Hoechst expects its imports from the US to be reduced which will gradually have an effect on its European production.

Hoechst meanwhile is understood to be ready to ship some quantities of feedstock acetaldehyde from its 96,000 ton/year plant at Lillebonne in France to its Bay City unit in Texas. Despite the slide in the US dollar against the Deutschmark, the company said it regarded the situation as an emergency and as such these steps were warranted on a short-term basis regardless of currency fluctuations. ECN also understands that affiliate company, Celanese Mexicana and US co-producers, Tennessee Eastman or BP could also make use of the extra feedstock to boost acetic outputs.

Hoechst-Celanese formerly made acetic acid by secondary oxidation (SO) of acetaldehyde at its Clear Lake and Bay City plants, but in the late 1970s the SO units at both plants were dismantled. Clear Lake now uses carbonylated methanol as a feedstock and Bay City continues to produce acetaldehyde.

Other major US producers, Tennessee Eastman, USI and BP are coming under increasing pressure to provide more product even though plants throughout the country are running flat out. One said his customers were on a 100 per cent sales plan and his plant close to full capacity. "We are totally unable to respond to instant requests," he said.

Most US product has been allocated to the end of the fourth

quarter so immediate price increases are unlikely, but in the light of recent events, some are predicting hikes of 2-3 cents/pound in January. Current acetic acid prices are running at 17-19 cents/pound (\$374-418/ton), compared with six months ago when they were around 16 cents/pound (\$352/ton).

Even though producers and buyers agree prices are, to some extent, being driven by acute supply shortages, producers are expected to blame part of the increases on higher feedstock number, particularly ethylene and methanol. As an example, European ethylene prices a year ago were quoted at \$240-245/ton. Today they have doubled to \$475-485/ton and US prices stand at \$374-385/ton. UT methanol prices are up, too, from \$70-75/ton to \$100-115/ton fob and \$160-180/ton cif buoyed by heavy winter purchasing, delayed shipments and plant shutdowns. Another aspect of the explosion is that the Pampa plant operated on a combination of propane and butane which in the current gas market is considerably cheaper than methanol.

Europe's acetic acid producers are bracing themselves for repercussions. But while the product and its derivatives are short and have been allocated up to the end of this year, producers feel shock waves will not reach Europe until next quarter.

"It's a major mid quarter incident", said one. "We always expect to get stock distortion towards the end of the quarter, but no one could have anticipated this shortfall." This VA producer expects to see price increases across the whole range of acetate products in January.

In the US, damage assessment teams are working at Pampa. A spokesman said there were many

useful and undamaged assets still in place, and the company was "very optimistic and positive about rebuilding." Pampa is receiving assistance from other units.

LOW CAUSTIC STOCKS SET TO FUEL PRICE INCREASES

Strong demand for caustic soda in Europe, US and the deep sea markets has forced prices to increase between four- and ten-fold over the last year. Downstream users, including the paper, pulp and aluminium industries are performing well and should continue to boost caustic requirements into next year.

At present, demand for co-product chlorine is also running high on the back of healthy PVC, paper and pulp business. Chlor-alkali plants in Europe are said to be operating at around 90 per cent of nominal capacity and slightly higher in the US.

Current UK spot prices for caustic are \$290-300/ton fob for liquid and \$350-360/ton fob for solid. Last year prices were as low as \$30/ton for liquid. Contract prices are set to follow the trend, although increases will be more modest. A major UK manufacturer is raising fixed contract prices in the new year to at least £110/ton for dry caustic but says the final number could be significantly higher.

In the European market, Belgium prices are low in comparison with the rest of the continent due to a number of competitive suppliers. Figures of BF7,000-8,000/ton are quoted for contract prices and in France between FF1,250-1,350/ton, with Germany at DM400-450/ton. With the weak dollar, some significant price differentiation between the US and Europe may occur. If this pushes up demand for US

caustic an increase in the US export price could result.

Caustic stocks have been moving downwards since 1986, and availability could become increasingly difficult, especially as chlorine demand remains steady. After a busy summer UK stocks are equivalent to 2-3 days' supply, sources say.

The largest current market segment for chlorine is vinyl chloride monomer (VCM). In Europe, 30 per cent of chlorine output is used to manufacture VCM. This figure is lower in the US, but still significant at 23 per cent. Speculation that VCM output will remain flat in 1988 has fuelled concern over chlor-alkali production and the consequent restriction on caustic.

US projections for annual growth in various chlorine market segments give a 1 to 2 per cent increase, whereas caustic soda markets are set to increase by a solid 2 per cent/year.

New capacity includes Niachlor, the Olin-Du Pont joint venture, which will come on stream in December, and Oxychem's Corpus Christi plant which will start-up in mid 1988. Also Dow is reported to be debottlenecking its 550 ton/day chlorine unit for the third quarter of 1988. In Europe there are no significant increases in capacity reported, although several plants are being refurbished, in particular with membrane technology replacing mercury processes.

The rise in caustic soda prices has had a knock-on effect in caustic potash and its derivatives. Over the past few years, European consumption of caustic potash has been steady and prices have remained stable at around \$800/ton for lye and \$900/ton for solid hydroxide. But potassium derivatives are set to increase as a result of two recent deve-

lopments. Canadian potash chloride prices have increased by more than 75 per cent in the US market and the price of caustic soda a raw material, is increasing. Caustic soda is currently showing gains of \$35/some 20 per cent.

In these circumstances a substantial rise in potassium product prices is anticipated in 1988. Market prices in France and the UK have been lower than the rest of Europe, which stands at around DM1500/ton, but an increase of around 15 per cent for products such as potassium carbonate is expected.

US and European price movements will shortly spready \$-based deep sea markets it is predicted which are less profitable to European producers. Increases of at least \$100/ton will be needed to sustain reasonable margins for efficient producers with a depreciated plant.

OCELOT, MITSUI DEAL

Ocelot Industries' 400,000 ton/year methanol plant at Kitimat in British Columbia, Canada is operating at 117 to 118 per cent of nameplate capacity, according to Ken Vidalin, vice-president and general manager Ocelot Ammonia. Only three years ago Ocelot was threatened with bankruptcy and the plant with closure.

Mitsui and Co. has recently signed a two-year contract with Ocelot to take 33 per cent of the plant's output. The price of methanol throughout the contract will be linked to market prices in Japan, and sources say the deal is worth \$40m over two years at today's prices.

Since then it has struggled with its poor financial situation and has cut its first half loss by \$10.7 million from \$38.3 million in 1986 to \$27.6 million this year.

News from the American Market

Caustic soda price rise

Occidental Chemical and Olin have followed Dow Chemical in raising off-list prices for caustic soda by \$25/ton. With U.S. chlor-alkali plants running at more than 90% of capacity, little customer resistance to raising caustic soda prices has developed, producers report. Domestic plant operating rates were 98.3% effective capacity in September, compared with 98.5% the previous month and 92.2% in September 1986, according to the Chlorine Institute. U.S. caustic soda output in the first three quarters of the year climbed to 6 million tons, 4% higher than during the year-earlier period.

Strong performance by the pulp and paper industry, which accounts for nearly 20% of caustic soda consumption, "has a lot to do with the current tight supply for caustic (soda) and the modest improvement in its price," Charles L. Mears, vice-president and general manager for electrochemicals at Occidental Chemical (OxyChem), said at a meeting of the National Assn. of Purchasing Managers last month. Australian aluminum producers are using nearly 1 million tons/year of caustic soda, and U.S. caustic producers are supplying much of that demand, Mears says. Production problems at European chlor-alkali plants, because of severe weather conditions this past spring, have helped boost overseas caustic soda demand, and Mears estimates that caustic soda inventories in Europe have dropped to 350,000 tons from a more typical 800,000-900,000-ton level. Brazil, moreover, is importing caustic soda for the first time in many years. OxyChem expects caustic soda demand to grow 2%/year through 1991. Capacity utilization rates of U.S. chlor-alkali producers will continue to be

high, Mears notes, with 1988 mirroring 1987, a slight downturn in 1989 and a production rebound in 1990 and 1991. He figures that chlorine output will gradually climb from 29,260 tons/day (93.7% of capacity) this year to 31,509 tons/day (100.9% of capacity) by 1991. To justify reinvestment in a grass-roots chlor-alkali plant, the price received for one electrochemical unit (ECU) — a ton of chlorine plus 1.1 tons of caustic soda — must equal \$300-400, and says Mears, it is likely to be several years before ECU values reach those levels. One ECU was equivalent to \$246 in the first half of this year.

U.S. ethylene stocks tumble further

Ethylene inventories in the U.S. have shrunk every quarter this year, according to statistics from the National Petroleum Refiners Assn. (NPRA), and are at the lowest level since the end of 1985, when a fire at the Mont Belvieu, Tex. natural gas liquids storage site caused stocks to plummet below 1 billion lb. On Sept. 30, NPRA reports, domestic ethylene inventories stood at 1.15 billion lb, compared with 1.27 billion lb at the end of the second quarter and 1.45 billion lb on Mar. 31. Inventories are being depleted even though ethylene producers are making more product. U.S. ethylene output in the third quarter was 9.083 billion lb, 10% higher than in the second quarter. Ethylene production for the first three quarters totalled 26.255 billion lb, which means that plants are running at an annual rate of 35 billion lb, compared with 33 billion lb in 1986.

Amoco Production will expand an EOR project

After a year's delay, Amoco Production will expand its

project to expand its carbon dioxide (CO₂) enhanced oil recovery (EOR) operations at the Wertz and Lost Soldier fields in southern Wyoming. Amoco decided to reactivate the project because it has found an economical way to avoid having to buy additional quantities of CO₂. The company has installed a plant to recycle 65 million cu ft/day of CO₂ at the Wertz Field. The recycling unit removes undesirable components from the CO₂ after it has been used in EOR. The cleaned CO₂ is then reinjected to recover additional oil. Amoco currently purchases CO₂ from Exxon USA's pipeline. Injection of CO₂ at Lost Soldier Field is scheduled for November 1988, and additional plant facilities are expected to be completed in the second quarter of 1989. The cost of the total project, which will add 85 million cu ft/day of EOR capacity, is \$75 million.

Peptides show good growth potential

With consumption of peptides in the U.S. expected to grow 10%/year, the market will reach \$4.4 billion by 1996, predicts Strategic Analysis Inc. (SAI), a business consulting firm based in Reading, Pa. Human health care, a major end-use market for peptides, will grow from a \$700 million business in 1986 to almost \$2.4 billion by 1996, according to an SAI study. Other major outlets for peptides include the food, agriculture and industrial sectors, which are expected to show annual growth rates of 4%, 7% and 17%, respectively. Use of peptides for animal health care will shoot up 48%/year from the current \$10 million base. While pharmaceutical companies have played a major role in introducing new peptides, biotechnology firms are becoming more active in the field, SAI notes. Peptides are being produced by recombinant-DNA technology and chemical and enzym

In the European Market

Naphtha is being buoyed up to \$150-153/ton cif but gasoline demand is still slack.

Prices are stable for propylene with a wide range of numbers from DM595/ton cif NWE for some off-spec material, to DM 705/ton delivered in rail cars. One producer sold at DM640 cif, but admits that this is now too low.

Ethylene prices are steady at \$475-485/ton cif NWE, and DM 900-950 free delivered W. Germany on the ARG pipeline. Technical problems at ROW's 180,000 ton/year G4 cracker, and 450,000 ton/year G6 plant, running at only 50-70 per cent capacity, has eased congestion on the ARG pipeline. Supply is

expected to ease further for December. Mitsubishi Japan has suspended operations at its 325,000 ton/year ethylene plant at Kashima and repairs are expected to last a week.

Benzene prices have dropped around \$10/ton to \$255-265/ton reflecting availability in Rotterdam. Contract business is being done but traders have little to play with on the spot market. One trader bought 1,000 ton from a Japanese trading house at \$261/ton, described as mid-market.

Gasoline demand has fallen away again leaving toluene drifting down to \$223-228/ton. In the US a lot was traded at 67 cents/gallon. Exxon is reported

to be looking for 67.5 cents/gallon but traders say this may be too high in a weakening market.

Xylenes prices are unchanged in a quiet market and producers expect these levels to continue until the end of the year. On UK producer did 2,000 ton virgin at \$240/ton.

European producers suggest paraxylene prices which stand at \$315-320/ton could be edging up. Indian buyers are negotiating for 5,000 ton in Europe but most business is on contract with good demand for polyester, PET, and DMT. US activity has been characterized by the closure of Phillips 209,000 ton/year plant in Puerto Rico for commercial reasons, and sources say it could be down for the rest of the quarter.

Orthoxylene prices are down a little to \$270-280/ton in a firm market and some Soviet material is expected to Europe in early December.

Butadiene prices are steady but levels as low as \$610/ton have been heard. US and Far East demand is strong, but Europe is tailing off.

Despite product movement in the styrene market there is little change to European prices. Demand is not sufficient to encourage spot activity even though all parties agree the market has firmed since last week. T1 business in Rotterdam was concluded at \$1 202/ton fob for 1 000 ton.

Panic buying on both sides of the Atlantic has pushed up methanol prices to around RM-245-255/ton fob Rotterdam T2 but spot material has dried up. Delayed Soviet shipments and serious shortfalls from frozen Baltic ports in the next quarter, have raised prices.



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News About New Projects

DSM POISED TO INVEST IN A WORLD-SCALE POLYPROPYLENE PLANT

Dutch State Mines (DSM), the government-owned chemicals group, is at an advanced stage of feasibility study to build a new polypropylene plant. The project would involve the construction of a world-scale PP plant by 1990.

Jacobus Franke, marketing manager Stamylan P (DSM's trade name for PP), said that the study has been under way for about 18 months and a decision is expected in the first half of next year. It is being carried out by an unidentified consultant.

Although DSM is regarded as a medium- to small-scale producer of PP, it is a leading producer in copolymers.

The company entered the PP business in 1977 with a slurry process using high activity catalyst. Its original 50,000 ton/year Mitsubishi Petrochemical process unit has been debottlenecked and expanded to the current 140,000 ton/year, reaching almost the end of the present possibilities to expand. The last debottlenecking took place last year. A substantial part of this is for copolymers.

DSM is very pleased with the present operation and would probably base the future plant, which would require an investment in the region of \$70m, on the same process.

Although it has not selected a site for the new unit, Geleen in Limburg, the location of its petrochemical operations, is regarded as the firm favourite. The Limburg complex currently has a capacity of 850,000 ton/year of ethylene and about 425,000 ton/year of propylene. The propylene feedstock is used internally and is also sold on the market.

DSM is building a 40,000 ton/year compounding unit at Genk

in the north of Belgium. The plant will be on stream in April next year at which time the existing compounding unit in the south of Holland will be closed down.

The Dutch producer sees the PP market growing at 5-7 per cent in the period to 1990-91. The biggest growth will be achieved in the copolymer field, especially high-impact and super high-impact and compounds. Here the product is competing with engineering plastics and is used as polycarbonate and ABS substitute. Growth rate in this area is put at over 7 per cent/year.

COMPRIMO/KELLOGG WIN GEP CONTRACT

Comprimo of Amsterdam and M. W. Kellogg of London, in a joint venture, will produce one of the most advanced computer integrated manufacturing facilities in Europe for General Electric Plastics Europe.

The fully automated extrusion plant, capable of compounding various GEP compounds and composites, will be built at Bergen op Zoom in the Netherlands at a total installed cost of Dfl. 250m (\$130m).

The state-of-the-art engineering plastics facility will have a fully integrated computerized system which controls all production and information processing from receipt of order to despatch of packaged end products from its automated warehouse to its domestic and export markets.

The Comprimo/Kellogg team will execute all phases of the project including overall project management as well as basic engineering of the facility. This also includes the development of sophisticated equipment and systems packages, detailed engineering, procurement and construction management.

The plant is being designed to allow rapid expansion and quick response to increased production demands.

Comprimo is an international engineering contractor with a total staff of 1,400. It gained its previous plastics experience on many polypropylene, new and revamp projects. Comprimo has extensive experience in work with lump sum, turnkey and lump sum services in addition to reimbursable contracts.

GEP has earmarked Dfl. 1.7bn for fresh investments, which will include a major polycarbonates plant.

SANDOZ FORMS JOINT VENTURE IN THE USSR

A new joint venture to produce sulphur dyes has been formed by Sandoz of Switzerland and Soyuzanilprom, the union of Soviet dyes factories. The company, which will be known as Tauria (a tribal name), will employ 75 people and produce 6,000 ton/year of a range of liquid sulphur dyes.

It will be based at Armyansk in the Crimea region of the Soviet Union and begin production in 1990.

Sandoz will put up 49 per cent of the SF10m (Roubles 8m) capital and contribute equipment and know-how. Exports will represent 20 per cent of the total output and Sandoz will have the exclusive rights to export. The Swiss firm says that the world market for these dyes is growing. Raw materials will be supplied by the Soviet Union according to Sandoz's specification.

This joint venture, signed in Moscow on November 23 in the presence of Yuri Besspalov, the chemical industry minister, is the first stage of co-operation between Soyuzanilprom and Sandoz on dyestuffs production. If developments are positive, expansion of the joint venture is planned.

EXXON INVESTMENT

Exxon Chemical is investing \$6m in its Antwerp ethylene vinyl acetate copolymer plant to expand existing product capacity and to produce a number of new materials particularly for specialized application.

The company has doubled to 100,000 ton/year the capacity of the plant to produce high EVA copolymer materials. These products, marketed under the **Escorene Ultra** brand name, are extensively used in the manufacture of hot-melt adhesives and in the packaging, electrical wire and cable, and agricultural industries.

"We are already the largest producer of EVA copolymers in Europe and this investment will further increase our ability to serve our customers," said Ron Cameron, Exxon Chemical's product manager. "Our speciality polyethylene capabilities cover a very broad range of products besides **Escorene Ultra**. The more recent additions were the introduction of our **Escomer** range of synthetic waxes and the extension of the **Escor** range of ethylene acrylic acid copolymers to include zinc and sodium ionomers.

"We shall be introducing more new products over the next two years, particularly some with improved properties for use in specialized applications and have in hand more programmes to broaden and improve the capability of our Antwerp plants still further."

MONTEDISON BUILDS NEW STYRENE MONOMER PLANT

Montedison's subsidiary Montedipe is investing L100bn (\$80.34m) in a new styrene monomer plant at its Mantua complex in Italy. The 200,000 ton/year plant is scheduled on stream in

the second half of 1989. It will raise the company's total styrene monomer capacity to 500,000 ton/year, placing it among the major producers.

Ethylene feedstock will be supplied from the company's Porto Marghera cracker and benzene will be purchased on the market.

The new unit will use technology developed by Montedipe rather than the Lurgi/Montedipe process, which has not yet been fully proven.

Montedipe engineers will carry out the design but construction work will be subcontracted out.

Most of the extra styrene monomer capacity will be used capatively in the production of polystyrene and styrenic polymers. The group's total European capacity for the products at present is 400,000 ton/year, including 300,000 ton/year in Italy. Its Finamont joint venture produces the remaining 100,000 ton/year in Belgium. All the product is marketed by Montedipe.

The company does not produce any ABS. This business was sold to Enichem in 1983.

The extra monomer capacity suggests that the Italian group is poised for a major investment in downstream production. Polystyrene and styrenic polymers are a strategic business sector for Montedipe.

Total Italian capacity for these products (excluding ABS) is 350,000 ton/year while the European capacity has been put at 2.64m ton/year.

The products are used in packaging, household appliances, insulation materials, the automotive industry, and other fields. Demand for styrenic polymers has grown by some 6.5 per cent/year in the last two years, the company says.

LITWIN WINS PMMA CONTRACT IN CHINA

Litwin of France has signed an \$8m contract with the China National Technical Import & Export Corp. Dalian branch for a polymethyl methacrylate (PMMA) plant, the first such facility in China.

Won against competition from Technimont of Italy, which proposing Vedril technology, the contract covers technology transfer, extended basic engineering, supply of major equipment, technical assistance for start-up for a 12 000 ton/year PMMA pellets and 1 500 ton/year PMMA sheets complex to be built by Anda for Longxin Chemical Co, Heilongjiang province. Polymer Technology Inc. (PTI) of the US is supplying the process technology.

Fierre Janvier, area sales manager at Litwin and in charge of PMMA sales, attributes this success to the very modern technology developed by PTI, a solution, continuous and non-polluting process. PTI and Litwin have already supplied plants based on this technology in the US, Czechoslovakia and in Taiwan. Several other new projects are under negotiation.

Litwin employs some 200 people and has a turnover of 400m. The contractor has tended to concentrate on geographical areas where it has been successful, such as Eastern Europe. In addition to the 10 000 ton/year PMMA plant which it is supplying to Czechoslovakia, Litwin is currently providing extended basic engineering for a major new alpha olefins plant in that country under a recently won contract. In the Soviet Union, Litwin is a member of a consortium setting up Tengiz I and is bidding for Tengiz II oil and sour gas development.

Biotechnology

EC RAISES COMMITMENT TO BIOTECHNOLOGY RESEARCH

The European commission has committed itself to biotechnology R & D until 1995 by agreeing to the Bridge programme (biotechnology research for innovation for development and growth in Europe). Taking over from the biotechnology action programme (Bap), which runs out at the end of 1989, the new programme aims to improve biotechnology research in several areas.

After criticism on Bap-industry links, Bridge will attempt to woo biotech companies. Dick Nieuwenhuis of the commission said, "A lot of companies are already behind research projects, but they need to be involved further." He said it was difficult to tell how the programme would work, but he hoped that it would improve communication within the industry.

The commission has already identified some of the hurdles it will have to overcome in order to achieve this. These include confidentiality of research findings and the structure of projects. Until now Bap has tended to break down R & D into sectors such as enzyme synthesis, microbiology and animal cell culture. Nieuwenhuis believes these boundaries are artificial, consequently Bridge will tackle some of the principles more fundamental to the technology as a whole.

Until now the size of research contracts has also inhibited industry participation. Averaging Ecu 55,000/year (\$ 70,587)

and two to three years long, contracts have been too small for large companies and too expensive for smaller concerns. The commission plans to increase the value of some contracts to between Ecu 150,000 and Ecu 200,000 to pull in the larger companies. This will limit the number of projects.

Bridge, within the official framework programme, has already been earmarked Ecu 100m — a substantial increase on Bap, which originally received Ecu 55m. However, a further Ecu 20m is being negotiated to revise Bap. This would allow the Portuguese and Spanish to join the programme.

Bio-informatics, risk assessment and training are areas where the commission wants funding to carry out further research within Bap.

GERMANY TO WAIVE BIOTECH RULES?

The West German health minister, Rita Sussmuth, has come out in favour of allowing the federal health authority, Bundesgesundheitsamt to grant exceptions to the existing safety rules which ban experiments with genetically manipulated micro-organisms outside the laboratory.

During a parliamentary debate, the minister said the federal government is considering changes in current laws governing safety in biotechnology. The regulations on genetic experiments, which are monitored by central committee on biological safety, apply officially only to government-sponsored research, but are voluntarily

upheld by privately financed projects.

Earlier this year a parliamentary committee examining the risks of new genetic technologies recommended a five-year moratorium on the release of altered micro-organisms. The recommendations were called "exaggerated and absurd" by the federation of German industry, BDI. A number of companies, including Hoechst, have applied for exceptions.

GIST-BROCADES TIGHTENS BELT

Gist-brocades, the Dutch biotechnology group, is planning to rationalize its activities to buffer a projected slip in earnings and to release cash for acquisitions and new investment. The company is to shed 350 jobs and close bulk yeast production. The company plans to save about Dfl. 40m-45m (\$ 21-24m).

George Eresser, Gist-brocades' chairman, claims that overcapacity in world markets for dry yeast is pushing prices down and raising competition. The position for wet yeast, he adds, is not much better. Fierce competition in the bulk antibiotics market is also causing the Dutch firm trouble.

Gist-brocades is now predicting that net income for the year will plummet 15 per cent from the Dfl. 111m earned in 1986. The dollar has also contributed to this downturn in prospects as about 70 per cent of the company's sales are conducted in foreign currencies.

The company is planning to expand its activity in aromatics from yeast derivatives, for which a new plant is currently

under construction, to enzymes and pharmaceuticals based on biotechnology. But the company has decided to shift from its 1984 plan to grow through in-house development to one of growth through acquisitions.

Meanwhile, the Dutch firm is launching its colloidal bismuth subcitrate anti-ulcer drug **De-Nol**. The drug's mode of action, according to the company, involves the local coating of the ulcer site and the local release of prostaglandins coupled with an anti-bacterial effect on **Campylobacter pyloridis**. Recent work implicates this bacterium in the aetiology of gastritis and peptic ulcer disease.

Gist-brocades is not yet in a position to market the drug but it does have plans to increase its marketing force.

BIOGEN/ROCHE DEAL

Biogen is to receive the rights to B-cell growth factors developed by the Swiss major Hoffmann-La Roche. These products are implicated in the acceleration of the immune reaction in humans to diseases such as leukaemia and arthritis. In return Roche will take over a Biogen laboratory in Ghent, Belgium where B-cell research is in progress. Biogen is to be granted royalties on the sale of products.

EEC POSTPONES HORMONE BAN

Officials at the European commission have avoided a trade war with the US by agreeing to postpone the EEC ban on meat treated with hormones by one year. Originally the ban was to come into force on January 1, 1988, but the US threatened retaliatory trade action if its \$130m trade into the EEC was jeopardized.

Ministers have agreed that the use of hormones will be prohibited from the original date but sales of domestically produced and imported meat treated with hormones will be permitted for a further 12 months. This compromise was opposed by four member states — Spain, Greece, Belgium and Eire. These nations were worried at the potential competitive advantage some states would have over others.

While the deal has averted confrontation in the short term it is likely that the US will still press its claim that any ban violates the standards code of the General agreement on tariffs and trade.

NEFARMA SLAMS DUTCH DRUG RULES

New Drug Price regulations in the Netherlands are being slammed by the Dutch pharmaceuticals industry. Dick Dees, the state secretary for health, has decided that Dutch pharmaceuticals will not receive a fixed subscription fee per healthcare subscriber from the government but will instead get cost price per medication plus a fixed amount to cover costs.

To encourage the use of generic substitutes, pharmacists will receive a bonus equivalent to a third of the difference between the generic and brand-named drug price. Dees is hoping to save Dfl. 500m (\$262m).

Nefarma, the Dutch pharmaceutical industry association, claims the move will affect the industry badly. Sales of generic drugs will rise from 8 per cent to about 15 to 20 per cent within a few years, according to Nefarma.

PEPTIDE LINK

Diamalt, the Munich-based Schering subsidiary, has signed an agreement with the California-based Bachem to co-operate on production and development of peptides. According to Schering the two partners will focus on the use of peptides in pharmaceuticals.

While Diamalt's strengths are in the production and purification of peptides using fragment condensation methods, Bachem is an important manufacturer of active peptide factors and intermediates according to the Merrifield method.

SANDOZ ACQUIRES GMCSF SUPPLIES

Genetics Institute, the biotechnology firm, has signed a supply deal with Sandoz for granulocyte macrophage colony stimulating factor (gmcsf). The biotechnology product is believed to have a potential for treating infections associated with Aids and cancer.

Details have not been revealed by the companies but it is believed that the US firm will receive royalty payments of up to 10 per cent of cost once the drug is marketed. Both firms have been working on gmcsf for a number of years and the drug is only one of many that the Swiss major has in its potential biotechnology arsenal.

Meanwhile, Baxter Travenol, the US drugs major, has announced its intention to take a 20 per cent stake in the US biotechnology firm. Baxter Travenol recently raised its stake in Genetics Institute to 1m shares or 7.5 per cent. Genetics Institute received notification of the filing under the 1976 Hart-Scott-Rodino Act.

Environment

PHILLIPS AND RAYTHEON FORM INCINERATION JV

Phillips Petroleum and Raytheon have established a joint venture, Incinatrol, to provide hazardous waste incineration services to industry and government. Incinatrol will build and maintain on-site hazardous waste facilities based on technology developed by Phillips Research.

Engineering and construction will be conducted by the Raytheon subsidiary offices in the locality of proposed facilities. Units in the UK will be served by Stearns Catalytic. Don Jackson, vice-president of Incinatrol, claims that the technology is proven as Phillips has operated a 1,000 ton/year unit at its Bartlesville site for the past four years.

Incinatrol has already acquired two contracts from Phillips refineries to build facilities that are much larger. The Bartlesville unit cost \$10m to build. The new units at Sweeny and Border in Texas should be completed within two years and although no price tag has been attached, they are expected to cost between \$25m and \$50m.

Jackson claims that Incinatrol is willing to license the technology to firms that have experience in processing but electronics and other firms would be expected to take the whole package. The US office of technology assessment has predicted that about 235 extra on-site incinerators will be required by the year 2000.

Phillips has received 440 enquiries about the technology in the US and Stearns Catalytics has held negotiations with UK

merchant incinerators and four chemical and drugs firms including Ciba-Geigy. "We believe we have the best demonstrated available technology," said Jackson.

The technology is based on rotary kiln incineration with modifications. "We have developed improvements to the feed system and the controls for the process, energy and emissions, claims Jackson. Waste destruction and removal efficiency exceeds current environmental requirements at 99.99995 per cent, added Jackson.

PULP CHEMICAL FIRMS FEAR TCDD

Canadian pulp bleach chemical producers are concerned about the recent US "Five Mill Study" conducted by the American Paper Institute and the US EPA. It reported the presence of 2,3,7,8 tetrachlorodibenzo-dioxin (tcdd) in paper sludges and products from some US mills.

One theory proposed is that chlorine bleach chemicals were a factor in producing the pollutant. Details leaked to the media have caused public anxiety about "deadly dioxin" being produced by pulp mills.

Virtually all Canadian mills use chlorine, chlorine dioxide, or hypochlorite as bleach agents and the industry is estimated to use 190,000 ton of sodium chlorate and 415,000 ton of chlorine a year.

Norm Thorgerson, CIL Inc's forest products business manager noted the study is inconclusive as to where and how

the tcdd is formed, and about the extent of environmental hazard posed in the 0.8 to 42 parts per trillion level found in the study.

"We are interested in finding solutions, whether or not chlorine is involved. However, we fear that public pressure could lead to non-productive activity," Thorgerson added.

ECOGEN AWAITS APPROVAL FOR ITS COTTON BIOFUNGICIDE

Hoping to be the first company to have a biological fungicide registered by the Environmental Protection Agency (EPA) for use on crops, Ecogen (Langhorne, Pa.) has submitted an application for Dagger G biofungicide, which relies on a naturally occurring strain of *Pseudomonas* bacteria. The product, says Ecogen, combats damping-off disease, a fungal disease that destroys cotton plant seedlings. The application to EPA follows three years of field trials in the cotton-growing states of Mississippi, Arkansas, Louisiana, Alabama, Missouri and Tennessee. The trials showed Dagger G "to be equal in effectiveness to a currently used chemical fungicide," says Ecogen.

ICI TO DEVELOP NEW PESTICIDES

ICI has opened its new Japanese agricultural research station at Tsukuba, science city. The £4.2m station will be used to develop rice pesticides that fulfill the stringent environmental demands of the Japanese market. ICI anticipates a major increase in its share of the market in the future.

Technological Scene Abroad

Morton Thiokol builds an R & D center at Motown

Jumping on the bandwagon with many other automotive chemicals suppliers, Morton Thiokol's Specialty Chemicals Group says it will build an \$8.6 million automotive technical center near Detroit. The 64,000-sq-ft unit, which is slated for completion in second-quarter 1989, will consolidate the automotive products research and development (R & D) activities of Morton Thiokol and its joint ventures.

Sumitomo builds R & D unit in Japan's Science City

Sumitomo Chemical has embarked on a \$126 million project to build a research and development (R & D) center at Tsukuba-based Science City, about 25 miles northeast of Tokyo. Upon completion of the center, expected in April 1989, about 200 researchers will begin work to develop materials, including inorganics, advanced composites, plastics, optical and other electronic products, says the company. The center also will include a plant to produce prototype products. Sumitomo, which paid \$28.2 million to acquire about 140,000 sq m of land earmarked an additional \$98.2 million for the center.

From Japan: Semiconductors for hostile environs

One of the drawbacks of silicon semiconductors is that they don't work at temperatures above about 200 C. But now, Japan's Tsukuba-based National Institute for Research in Inorg-

anic Materials (NIRIM) has developed four sample diodes made of cubic boron nitride that, it says, perform the function of semiconductors at temperatures up to 650 C. The next step, say researchers, would be to develop electrode materials that can withstand equally high temperatures, a task NIRIM says it won't tackle alone. If that's successful, the cubic boron nitride diodes can be used in space, in nuclear reactors and in other hostile environments. Another project that NIRIM has yet to investigate: development of cubic boron nitride for use as light-emitting (bluish-purple) diodes.

A program to collect remote environmental data

A new computer program available from Dranetz Technologies (Edison, N.J.) promises to collect environmental data automatically over telephone lines from remote locations, then display and print the information on an IBM-compatible personal computer. When a preset threshold of a monitor is violated, the program gives the location of the occurrence, the time it happened (to the nearest 0.01 second) and the peak excursion.

Program to estimate the cost of equipment

A new technology agreement promises to ease the job of estimating equipment costs during process design. Under the agreement, process simulation software developed by Aspen Technology (Cambridge, Mass.) will include a price-and-del-

ivery quoting service developed by PDQ\$ (Gates Mills, Ohio). Aspen's software, called Aspen Plus, is used to create a model of a process that simulates how materials flow through a plant and how they react and change with temperature. PDQ\$ provides cost data for major equipment types.

A three-piece coupling for plastic pipe

A reinforced plastic pipe system that matches the pressure capability of steel pipe has been developed by General Composites (Orange, Calif.) and is being manufactured by General Composites Canada (Nisku, Alberta). The key to the high-pressure capability is a mechanical coupling that joins sections of the filament-wound pipe. Charles Kaempfen, chairman of General Composites and developer of the coupling technique, points out that the epoxy glue conventionally used to seal plastic pipe is limited to pressures of about 1,000 psi, compared with 3,000 psi for steel pipe. Kaempfen's mechanical coupling consists of three reinforced polyester pieces. Two are half-couplings that fit around a pipe joint from opposite sides & lock together to resist longitudinal stress. The third piece is a filament-wound sleeve that fits over the assembly to hold everything together and to provide hoop strength. A natural or synthetic rubber gasket seals the space between the two pipe ends. "This configuration can maintain a seal at 12,000 psi with any conventional pipe diameter", Kaempfen maintains. General Composites says that the system meets or exceeds at least seven standards for pipes used for transporting water, chemicals and liquid petroleum products.

News from Japan

Research Focused on New Materials and Biotechnology

The Petroleum Energy Center has revealed a survey indicating that petroleum companies will be regarding 'new materials' and 'biotechnology' as most important in R & D activities from now on.

With regard to R & D themes, companies are reported to have a common stance that independent R & D activities are insufficient to attain targets and thus should be promoted in cooperation with other companies, for-

foreign counterparts, and research institutes.

This survey has been compiled, based on review meetings by the center's research resource utilization subcommittee and questionnaire addressed to research and development-oriented petroleum companies by a contracted survey agency.

With regard to future trends and themes in research and development activities in the petroleum industry, companies regard new materials and biotechnology as most important. In concrete terms, for the improve-

ment of petroleum refinery, conversion process, knowledge engineering, and the separation process are given top priority. In terms of new technology, new materials, biotechnology, and new energy are regarded as most important. Companies say that they will increase by 50% the number of research staff for biotechnology and new materials.

Technological innovations have been seen particularly in the sector of electronics, new materials, and biotechnology, and innovations in petroleum technology will be attained by utilizing related technologies such as optical measurement control, AI, membrane separation, and bioreactors. It seems that the promotion of such technological innovations in petroleum is regarded as necessary to reinforce the domestic petroleum industry and energy foundations.

With regard to future themes in R & D activities, the petroleum industry as a whole has been making efforts at least in the allocation of management resources for research and development.

In reality, however, there is a shortage of resources including personnel, materials, and funds. The survey report points out that in order to resolve this question, it is necessary to improve investment efficiency by flexible allocation and utilization of labor, materials and funds. It also points out the need for reviewing resource allocations and the structure of organizations.

Most of the respondents say that independent R & D activities are insufficient and should be promoted in cooperation with other companies and foreign counterparts. All of them

IMPORTANT THEMES IN FUTURE R & D ACTIVITIES IN THE PETROLEUM INDUSTRY (Unit: %)

	Important	Most Important	Total
Improvement of Petroleum Product Production			
Separation process	50.0	16.6	66.6
Sulfurization process	25.0	—	25.0
Conversion (FCC, etc.)	66.0	25.0	91.6
Process	41.6	—	41.6
Added materials etc.	33.3	8.3	41.6
Management/control (per AI)	50.0	—	50.0
Hydrogen fuels	—	—	—
Oil liquefaction	58.3	25.0	83.3
Knowledge engineering (AI)	—	—	—
Others	8.3	—	8.3
Addition of new value to petroleum	8.3	—	8.3
Diversification of New Technology			
Catalysts	75.0	8.3	83.3
Petrochemistry)	(8.3)	—	(8.3)
Fine Chemicals	33.3	8.3	41.6
New materials			
Organic materials	41.6	50.0	91.6
Inorganic materials	41.6	16.6	58.3
Metal Materials	8.3	—	8.3
(Electronics)	(8.3)	—	(8.3)
Biotechnology	33.3	41.6	75.0
Space	—	—	—
Marine development	—	—	—
New energy			
(solar battery, fuel battery)	50.0	16.6	66.6
Medicine, Pharmaceuticals	16.6	8.3	25.0
Information/Communications	16.6	8.3	25.0
Transportation/physical distribution system	—	—	—
Others	8.3	—	8.3
Secondary/tertiary recovery of petroleum			

say that this is necessary in order to compensate for gaps in their knowledge and knowhow, while 80% of them suggest labor and 50% quote insufficient R & D facilities as reasons.

In order to promote R & D activities for a creative, challenging, and efficient petroleum-related technology, it will be indispensable to establish a joint-research network, by flexibly using external research funds.

Adhesive Production Seen Topping 1 Million Tons

The supply-demand situation for adhesives is taking a turn for the better since demand has increased for use in plywood — which accounts for a little over 40% of the total demand for the products — woodwork automobiles, household electrical appliances and, in particular, construction/civil engineering. Several producers are operating their plants at full capacity.

The industry's growth rate for the whole of 1987 is projected to reach the 10% level. Japan Adhesive Industry Association originally estimated this year's adhesive production to stand at 984,600 tons. Actual production will, however, exceed one million tons since producing activities are being accelerated in the latter half of this year.

Adhesive operations are easily affected by the overall business trend. Supply of and demand for adhesives declined in 1982 for the third consecutive year reflecting low economic growth. They moved up in 1983 due to recovery of plywood use. After that, however, the business operations concerned again suffered negative growth since demand for use in plywood dropped again.

Adhesive producers are still vexed about market prices being at comparatively low levels. They have yet to pass on increased raw-material resin costs to the prices of their products, in particular those for use in construction and paper diapers. They need to restrain themselves from excessive marketing competition.

Mitsubishi, Huntsman (US) — To Set Up Joint SM Firm

Mitsubishi Corp. and Huntsman Chemical Corp. — America's largest polystyrene (PS) producer — have agreed to establish a 40:50 joint company aimed at producing styrene monomer (SM).

In connection with this, the U.S. company is scheduled to buy within a year a 273,000 t/y SM plant — located in Baton Rouge, Louisiana, the United States — from Hoechst Celanese. It intends to scale up the plant production capacity to 410,000 tons a year and the planned joint company will operate the revamped plant 15-18 months after the parent company buys it.

Huntsman Chemical has been leasing another SM plant from the same U.S. company on a long-term basis and has now decided to buy the said plant, forecasting that SM will continue to be in short supply for a few years in the States. The plant concerned has been idle since 1981.

SM produced by the plant will be supplied to Huntsman Chemical's joint-venture company with General Electric (US), Huntsman Chemical PS plant now under construction in Britain, and other users. Huntsman Chemical is seeking out-

lets for SM since some 200 tons a year of the product be in oversupply when the modeled plant is put into commercial operation. The company's US production capacity stands at 460,000 tons a year accounting for a little over 1% of the U.S. combined production capacity.

Mitsubishi handles at 450,000 tons a year of SM produced in Canada and Saudi Arabia, etc. The leading Japanese trader has a PS processing filiate in the States and has established a PS-marketing system there. It is aiming at diversifying supply sources of SM.

Construction starts on Bayer Speciality-resin — compound plant

Bayer Japan Ltd., held in October a ground breaking ceremony for construction of its engineering plastic compound plant in Japan. There is a automobile plant in Toyohashi.

First-phase construction cost about Yen 3-billion and plant will produce polybutylene of polycarbonate, polyamide and polyamide 66, etc. at a rate of 3,500 tons a year to begin with. Additional capacity expansion will also be planned depending on how the market moves.

Completion is scheduled for next summer with start-up in regular operation planned for next October. At the plant a technical service center as well as facilities associated with rubber technology will also be constructed under Bayer's long-range strategy for polymer operations in Japan.

New Developments from Japan

Sumitomo Chemical Develops New Production Process For Alkyl

Sumitomo Chemical Co., which has been positively promoting the marketing of metaporphenol (MAP) based on resorcinol, has announced that it has established an entirely new production process for a variety of alkyl MAPs based on alkylation of MAP.

The company has already started the construction of a plant with an annual production capacity of 800 tons within the framework of its Ehime Plant which is scheduled to be completed by the end of this year.

The new process involves few by-products and is extremely economical, when compared with conventional processes. Its major feature is that it can produce a variety of products with the same production facilities.

Sumitomo Chemical Co. developed a new MAP production method using resorcinol as a starting material. In the middle of 1987, the company completed the world's largest plant with an annual production capacity of 1,000 tons within the framework of its Chiba Plant.

Alkyl MAP production used to be based on sulfonation fusion process using nitrobenzene as a source material. This process, however, has led to wastewater treatment problems.

The new process is simple and ensures high economic efficiency as it involves a low load in waste-water treatment. The company is planning to focus its efforts on the development of derivatives and is posi-

tively promoting the exploitation of the global market.

Superconductive Oxide Material Transformed into Coiled Magnet

Furukawa Electric Co. has succeeded in producing a wire from high-temperature superconductive materials of yttrium-barium-copper oxide and applying it to manufacture of a coil-shaped magnet. Oxide-based high-temperature superconductive material is so fragile that it is difficult to transform it into wires and coils.

The company produced a wire (diameter: 1 mm) from powder of special active superconductive material using an extrusion method and wound it around a frame, thereby producing a coil of 20 turns. The wire used was 150 mm long. The coil was heated and cooled in air in order to produce a magnet therefrom. This magnet has a critical current density of 1,330 A/cm² in a zero magnetic field. It has been confirmed that the magnet can repeatedly attain the value.

The technical breakthrough has been achieved on the basis of cooperative research conducted by the company itself, Hokkaido Electric Power, Tohoku Electric Power, Tokyo Electric Power and Electric Power Development. They are aiming at producing a high-powered magnetic field by increasing the critical current density and the number of coil turns.

Dye-applied Compatible Optical Disks Pioneered

Pioneer Electronic Corp. and TDK Corp. have jointly deve-

loped two-types of dye-applied optical disks (diameter: 5.25 inches;) which are compatible with each other and meet the International Standardisation Organisation's standards for optical-disk size, thickness and format.

In connection with this, the two companies have established technology for directly spin-coating cyanine-type dye onto polycarbonate (PC) substrates. It has hitherto been difficult to do so with the dye. The technical breakthrough will help ensure steady supply of dye-coated optical disks in large quantities and promote production/employment of such optical disks.

Users can put data onto optical disks which have already been used in, for example, document-filing systems. The systems are however, not compatible with each other since they are being manufactured by many companies in accordance with different formats. Users are, therefore, inconvenienced by the incompatibility of the said systems.

They have ardently hoped for supply of compatible optical disks by two or more manufacturers.

Asahi Glass Makes Polymer Alloy From PPS.

Asahi Glass Co. recently announced that it has developed five new grades of polymer alloy of polyphenylene sulfide (PPS) resin using the company's own sulfur-contained polymer and has recently started selling them.

It is first in Japan to make a polymer alloy from PPS. While maintaining PPS's physical properties, manufacturing

costs are 20—30% lower than conventional product, making it possible to replace products in the general-purpose engineering plastic market.

In the case of two of the new grades, six color products using them have been developed and marketed.

Clinical Tests on Alzheimer Disease Drug Due in Japan, U.S.

Snow Brand Milk Products Co. has decided to tie up with American drug companies for clinical tests on the anti-Alzheimer-disease agent the Japanese firm has developed together with Israel Institute for Biological Research (IIBR). Clinical tests on the agent having the code name "AF 102B" will thus be conducted in both Japan and the U.S.

Snow Brand is intent on commercializing the drug on a global scale as it has obtained the sales rights for the world. Following clinical tests in the U.S., the company plans to also start clinical tests in Europe. The starting of the first such tests in the U.S. stems from the fact that there are more sufferers of Alzheimer disease in the U.S., than in Japan and the U.S. is getting ahead of Japan in the diagnosis of this disease.

AF 102B is a substance associated with acetylcholine which is considered to play an important role in development of this disease. The Japanese company has carried out preclinical tests on it using animals and hopes to conduct human tests by next summer in Japan.

It has already concluded an agreement with Ishihara Sangyo Kaisha under which the latter will undertake production of AF 102B in bulk.

The American companies with which Snow Brand will link have not been identified. It says negotiations are under way with a plural number of drug firms.

New Albuminous Drug Proves Effective Against Kernicterus and Severe Hepatitis.

A research group headed by Professor H. Maeda at Kumamoto University has announced that they have succeeded in the development of a new albuminous drug that can efficiently remove free bilirubin (bile pigment) in blood.

Based on the combination of an enzyme called bilirubin oxidase (BOX) originated from a microorganism with polyethylene glycol, this drug can remove bilirubin and be extremely effective in the treatment of kernicterus neonatorum and severe hepatitis which show a high mortality rate. The research group is currently engaged in the confirmation of its effect, and Kurary Co. and Amano Pharmaceutical Co. are planning to jointly tackle its commercial production.

The new albuminous drug developed by Professor Maeda et al. is a PEG-BOX conjugate. The bilirubin decomposition enzyme called BOX isolated from a microorganism has seven amino bases as its active sites but has a low activity. Five to six of its carboxyl bases of which there are more than 30 were transformed to amino acids, to which PEG was linked chemically to obtain a conjugate.

When this PEG-BOX conjugate was administered to test animals using rats with icterus

to examine enzymatic act against free bilirubins in b they could be decomposed removed at an extremely rate, with antigenicity disappearing and its half life in blood residence time much extended.

Kernicterus neonatorum involves a jaundiced symptom due to the functional immaturity of the liver, resulting in the failure to cope with bilirubins produced in large volume from hemoglobins generated from red blood cells that become unnecessary after birth. The symptom disappears around ten days. However, depending on the delivery condition and blood type incompatibility between the mother and the infant, the newborn may suffer from a hemolytic disease (erythroblastosis fetalis) in which blood free bilirubins not bound to plasma albumins should increase abnormally, they destroy cranial nerve cells resulting in the death of the infant within five or six days.

In the case of severe hepatitis, free bilirubins increase in the blood, affecting the central nerve system. This disease is known to show a high mortality rate, and if death could be avoided, the infant would be suffering from cerebral palsy.

One treatment method has been developed uses a membrane to remove free bilirubin in the blood. The PEG-BOX conjugate, however, is a drug which decomposes and removes free bilirubins in the blood and has proved dramatically effective in the treatment of these diseases. It is also effective in the improvement of cranial nerve cells.

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MARKET INFORMATION

Chemicals Steady

We cannot guarantee the accuracy of the prices published in CHEMICAL WEEKLY as they are based only on the enquiries made by our correspondent — and, as such they are not FIRM PRICES as between a buyer and a seller. The prices are published only with a view to giving some ideas of market conditions.

The prices are inclusive of Excise and Maharashtra Sales Tax.

The dyes section was normal. All dyestuffs were in good demand. Upcountry enquiries were encouraging.

The Bombay Chemicals and dyes market had gone through a steady week with most of the major items ruling normal.

Phenol, which was quoted around Rs. 43, had come down slightly. Maleic anhydride was also subdued. Titanium dioxide ruled steady. There was good demand for caustic soda and soda ash.

(Prices as on 24th December, 1987)

INDUSTRIAL CHEMICALS		Per kg.					
Ammonium sulphate		2.00	Boric acid (Tech.)	21.00	Cream of Tartar (Tech)	54.00	
Ammonium phosphate (Mono)	14.50		Bisphenol-A	58.00	Citric acid (Belgium)	40.00	
Ammonium phosphate (DI)	12.00		Butyl carbitol	35.00	Citric Acid (Indian)	39.00	
Ammonium carbonate (DI)	17.00		Caustic soda (Flakes)	8.25	Copper sulphate	16.50	
Ammonium bicarbonate	4.75		Caustic soda (Solid)	7.75	Chromic acid	50.00	
Ammonium chloride	3.50		Caustic soda (Lye)	5.00	Cyanuric chloride	120.00	
Ammonium nitrate	4.50		Calcium chloride 70% (solid)	3.25	Cobalt oxide	280.00	
Barium white powder	21.00		Calcium chloride 75-80% (fused)	3.50	Carbitol	52.00	
Acrylamide	65.00		Calcium chloride 96% (Anhydrous)	6.00	Dicalcium phosphate (Anhydrous)	16.00	
Barium carbonate	6.00		Calcium carbonate (PPT)	3.00	Ferric chloride (Lumps)	7.00	
Bleaching powder (33% Cl)	3.25		Calcium carbonate (Activated)	3.55	Ethylene urea	56.00	
Borax (Granular)	14.00		Camphor (Indian)	84.00	Glue flakes	8.40	
Borax (Powder)	14.50		Cresylic acid	50.00	Glue sheets	6.70	
					Gohsenol GH 17	72.00	

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Visen Chemicals Pvt. Ltd.

222/A, Virwan Industrial Estate, Western Express Highway,

Goregaon (East), Bombay-400 063

Phone : Res. : 6722385

Hydro	37.00	Sodium chlorite 50% (Spain)	81.00	Chloroform	25
Hyflosupercell	19+ST	Santobrite (Indian)	36.00	Carbon Tetrachloride	12
Hexamine	29.00	Soda Ash (Tata)	4.00	Cyclohexanone	40
Industrial Wax	25.00	Soda Ash (Birla)	3.75	Cyclohexanol	44
Litharge	15.00	Soda Ash (Imp.)	3.50	Diacetone	34
Lead Acetate (Tech.)	26.00	Sodium bicarbonate	5.50	Diethylene glycol (DEG)	30
Lithopone	15.00	Sodium bisulphite	4.50	Diethyl Phthalate	52
Magnesium chloride (crystal)	2.00	Sodium silicate	3.00	Diallyl Phthalate	56
Menthol crystal (Flakes) 185+Ex.+ST		Sodium acetate	5.90	Dimethyl Phthalate	28
Menthol bold	205+Ex.+ST	Sodium alginate	220+ST	Diethyl Adipate	52
Menthol crystal bold	245+Ex.+ST	Titanium Dioxide (Anatase)	51+ST	D'butyl Adipate	42
Magnesium carbonate (Japan)	16.00	Titanium Dioxide		Dipentene	15
Magnesium carbonate (Indian)	15.00	(Rutile — RCR ₂)	65+ST	Dimethylamine 40%	12
Maleic Anhydride (per kg)	38.00	Tartaric acid (Crystal)	94.00	Dimethylamine 60%	14
Mercury (75 lbs.)	9,000.00	Trisodium phosphate	4.80	Ethyl Acrylate	46
Nickel chloride	65.00	Thiourea	67+ST	Ethyl Acetate	23
Oxalic acid	20.00	Urea (Tech)	2.75	Ethylene Dichloride	11
Peppermint oil (Rectified) 90+Ex.+ST		Vacuum salt	1.00	Ethylene Glycol	23
Potassium carbonate (Indian)	19.00	Zinc Dust	30.00	Formic Acid (Imp.)	30
Potassium carbonate (Imported)	21.00	Zinc Oxide	28.00	Formaldehyde	5
Potassium bichromate	22.00	Zinc chloride powder		Glycerine (CP)	50
Potassium phosphate (Mono)	14.00	(technical)	14.00	Glycerine (IW)	48
Potassium phosphate (Di)	14.00	Zinc sulphate	4.00	Hydrogen peroxide 50%	26
Polyvinyl alcohol (No. 117)	88.00			Iso Propyl Alcohol	22
Polyvinyl alcohol (No. 173)	84.50			Iso Butyl Alcohol	28
Polyvinyl alcohol (No. 208)	93.00			Monoethanolamine	46
Paraformaldehyde	16.00	SOLVENTS	Per kg.	Morpholine (Indian)	65
Phthalic anhydride 96%	23.25	Acetic Acid (Glacial)	12.50	Melamine	35
Pentaerythritol	60.00	Acetic Anhydride	30.00	Methyl Ethyl Ketone	35
Paraffin wax	13.50	Acetone	24.00	Methyl Isobutyl Ketone	36
Paralite (German)	70.00	Adipic Acid	50.00	Methyl Acrylate	42
Paralite (Czech.)	46.00	Aceto Acetanilide	50.00	Methylene Dichloride	24
Sodium sulphate (Fine)	4.00	Aniline Oil	42.00	Meta Cresol	45
Sodium sulphate (Coarse)	3.80	Benzoate Plasticiser	33.00	Nitrobenzene	19
Sodium sulphide 50-52% (Flakes)	8.00	Butyl Acetate	42.00	Nitric Acid (Con.) (RCF)	2
Sodium sulphide 58-60% (Flakes)	9.00	Butyl stearate	36.00	Ortho Cresol	32
Sodium sulphide pure (Flakes)	12.25	Butyl acrylate	67+ST	Phenol	43
Sodium nitrite	13.85	Butanol	45.00	Propylene Glycol	30
Sodium chlorite 80% (Spain)	90.00	Benzyl chloride	24.00	Polyethylene Glycol (No. 200)	40
		Benzo trichloride	16.00	Polyethylene Glycol (No. 400)	37
		Benzoyl chloride	22.00	Polyethylene Glycol (No. 500)	42
		Benzyl alcohol (FPC)	36.00		
		Bromine Liquid	42.00		

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Polyethylene Glycol (No. 4000)	38.00
Polyethylene Glycol (No. 6000)	50.00
Para Cresol	40.00
Styrene Monomer	32.00
Sorbitol	17.00
Trichloroethylene	26.00
Triethanolamine	50.00
Sulphuric Acid	2.10
Turpentine Oil (Germany)	8.00
Turkey Red Oil (50%)	11.75
Triethylamine	50.00
Vinyl Acetate Monomer	41.00

SOLVENTS	Per Litre
Benzene	8.90
N-Heptane	8.00
N-Hexane	8.75
Methanol	7.00
Solvent Naphtha Heavy	9.50
Solvent Naphtha Light	8.50
Toluene	10.50
Xylene	12.50

DYES INTERMEDIATES PRICES ARE WITHOUT TAX & EXCISE	Per kg.
Alphanaphthylamine	54.00
Alpha Naphthol (Imp.)	155.00
Aceto Acetic Ester (Methyl)	65.00
Ammonium Molybdate	170.00
Anthraquinone	80.00

Anthranilic Acid	60.00	N-Methyl J. Acid	390
2-Amino-4-Nitrophenol (Imp.)	140.00	N-Methyl Aniline	145
Blue B. Base (Local)	235.00	Napthalene crude	14
Beta Naphthol (Atul)	58.00	Napthalene (Refined)	18
Benzidine Dihydrochloride (BDH)	70.00	Ortho Anisidine (OA Imp.)	84
Bromamine Acid	375.00	Ortho Dichloro Benzene (OBCB)	10
BON Acid	107.00	OT Base	93
Chicago Acid	280.00	Para Dichloro Benzene (PDCB)	18
Coach Acid	58.00	Para Anisidine (PA-Imp.)	110
C. Acid (Imp.)	260.00	Para Anisidine (PA-Local)	87
Cyanuric Chloride (Japan)	120.00	PNA	66
2, 4, DNCB	26.00	Para Cresidine (Imp.)	325
Dihydrothio PTOS (Imp.)	500.00	Para Amino Azo Benzene (India)	122
Dimethyl Aniline	58.00	PNCB	27
Diethyl Aniline	140.00	Para Amino Acetanilide	140
Di-amino stilbene disulphonic acid	115.00	1-Phenyl 3-methyl-5 Pyrazolone	115
3, 3-DCB (Imp.)	155.00	Phenyl J. Acid	34
Gamma Acid (Atul)	160.00	Para Amino Benzoic Acid	170
H. Acid (Atul)	150.00	PT Base	81
G. Salt	56.00	Rhoduline Acid	500
Isophthalic Acid	39.00	Resist Salt	18
J. Acid	270.00	Resorcinol	13
J. Acid Urea	270.00	Sodium-Napththionate	6
K. Acid	95.00	5-Sulpho-Anthranilic Acid	60
MDPS (German)	200.00	Sulpho Tobias Acid	100
MNA	75.00	Sulphanilic Acid	20
Meta Urido Aniline	135.00	Trichloro Benzene (TCB)	18
MPD (Local)	125.00	Tobias Acid	10
MPD (Japan)	150.00		
Naphtenic Acid	11.00		

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(Prices as on 24th December, 1987)

ACID COLOUR	Per Kg	Brill. Violet Extra	126.40	Violet RL	275.4
Acid Violet 4BS	143.00	Blue 2B	86.60	Scarlet RR	214.4
Acid Maroon V	110.00	Blue G	170.50	Rubine 3B	223.4
Acid Orange II	77.80	Sky Blue FB	188.25	Rubine CB	364.4
Acid Orange IIV	63.05	Copper Blue GR	147.00	Blue GL	318.4
Acid Red A	107.25	Fast Greenish Blue GL	114.60	Blue BGF	636.4
Cresoln Scarlet MOG	155.00	Developed Black BT	116.10	Navy Blue RE	270.4
Acid Scarlet 3R	99.90	Blue NB-2B	300.20	Brown 3REL	200.4
Acid Red 38N	135.00	Blue NB-2BC	185.30	Black GEL	324.4
Acid Red R2R	132.00	Developed Black NB-BHB	185.30	Dark Brown 3B	317.4
Acid Red RS	88.00	Green B	111.65	BASE COLOURS	
Acid Green V	330.00	Green NB-B	188.25	Per Kg	
Acid Patent Blue AS	250.00	Green 2B-N	188.25	Fast Yellow GC	80.2
Acid Coomasil Blue	200.00	Brown MR	154.40	Fast Orange GC	135.4
Acid Yellow 5GN	65.00	Brown CN	107.25	Fast Scarlet R	166.6
Acid Red PG	85.00	Golden Brown G	140.35	Fast Scarlet RC	126.6
Acid Red GRS	78.00	Catechin G	120.50	Fast Scarlet RCR	99.0
Acid Black 10 BX	121.95	Omega Tan	126.40	Fast Scarlet G	121.6
Acid Black BX	98.40	Catechin GS	102.80	Fast Scarlet GN	91.6
Acid Black Wax	135.50	Black E Hly Conc.	142.60	Fast Scarlet GG	72.7
Crocinil Yellow GS		Black E Extra Hly Conc.	142.60	Fast Scarlet GGS	72.7
(I.C.I., UK)	265.00	Black NB-ER Hly. Conc.	310.50	Fast Red B	203.2
Crocinil Red GS (I.C.I., UK)	530.00	DISPERSOL COLOURS		Fast Red RC	119.1
Crocinil Blue RS (I.C.I., UK)	316.00	Per Kg		Fast Red R Flakes	149.2
Crocinil Scarlet G		Yellow 6G Powder	143.80	Fast Red TR	166.6
(I.C.I., UK)	800.00	Red B 3B Powder	247.80	Fast Red TR Oil	183.1
Crocinil Orange G		Red B 2B Powder	323.20	Fast Red RL	237.1
(I.C.I., UK)	250.00	Red CB Powder	439.15	Fast Red KB Oil	201.9
Crocinil Rubine (I.C.I., UK)	550.00	Red D2B Powder	477.40	Fast Bordeaux GP	201.9
DIRECT COLOURS		Violet C 4R	621.90	Fast Garnet GBC	94.0
Per Kg		Blue BG Powder	235.45	Fast Violet B	505.6
Yellow 3GX	88.10	Blue BN Powder	103.75	Fast Blue BB	521.4
Un Yellow RCH	124.40	Blue D 2R Powder	476.25	NAPHTHOL COLOURS	
Fast Yellow GCH	141.16	Navy BT Powder	243.90	Per Kg	
Yellow CFG Hly. Conc.	312.00	Blue B 2G Powder	210.20	ASG	217.0
Fast Yellow GS	111.65	Black BT Powder	182.60	AS	143.0
Fast Yellow CHR3	95.45	Blue BR Powder	390.20	ASSW	279.7
Disperse Orange A	166.15	Yellow 7GL	338.60	ABBS	188.1
Fast Orange GR	133.75	Yellow 5RX	218.80	ASBO	195.6
ed	96.90	Yellow 3G	367.25	ASD	175.6
ark Tan	78.25	Yellow	140.00	ASOL	179.3
ed IIR	72.55	Yellow AL	135.30	ASTR	279.7
ed 4B	169.10	Yellow Brown REL	247.50	ASPH	279.7
Bordeaux BW	132.30	Yellow FFL	463.60	ASE	196.0
Fast Scarlet 4BS	166.65	Gold Yellow GG	259.70	ASEI	184.4
ed 12B	170.55	Pink REL	247.00	ASLB	1632.6
Bordeaux Hly Conc.	194.00	Red REL	468.65	ASBT	1817.0
otton Red N	117.05	Red 2B	327.40	ASWG	143.0
III. Fast Hello B	278.00	Red FB	324.20	ASSG	397.7
III. Fast Hello 2B	297.00	Red Violet FBI	469.85	ASSR	480.5
III. Fast Hello 2R2	136.20	Orange 3R	196.65		
III. Fast Hello BS	116.10	Violet 3R	280.60		
		Violet 6R	485.75		

TION COLOURS		Per Kg.				
en Yellow HR	181.80	Navy Blue M 3R	310.95	Blue R Conc. Pdr. Fine	577.65	
Yellow H4G	117.85	Brill. Blue MR	331.70	Blue RR Supra Powder	629.35	
ra Yellow H-8GP	168.55	Brill. Blue M RX	214.20	Blue Conc. Powder	645.80	
Yellow HE6G	166.95	Brill. Blue M-G	382.30	Brill. Blue 2R Hly. Conc.	378.55	
ow H-E4R	276.05	Blue M 4GD	344.60	Brill. Blue 2R Supra Disp.	115.65	
Yellow H7G	332.30	Navy Blue M RB	318.75	Dark Blue 2R Powder Fine	389.25	
low M4R	243.95	Turquoise M-G	197.85	Blue BC Supra Disp.	359.40	
low M GR	326.05	Brill. Blue M GX	302.50	Jade Green XBN Powder Fine	438.20	
Yellow M4G	177.10	Blue 3R Acra Powder	718.20	Jade Green XBN Acra		
Yellow M8G	332.30	Dark Brown H 6R	248.45	Conc. Powder	823.90	
low M 3R	217.60	Cobalt Oxide (per kg.)	285.00	Jade Green 2G Pdr. Fine	419.65	
Orange H 2R	241.85	Green H 4BD	269.80	Jade Green 2G Ptg. Paste	125.40	
Red H 7B	157.95	Green H-E4BI	169.80	Jade Green XBN Ptg. Paste	126.00	
Orange M 2R	313.15	Red Brown H IF	143.25	Jade Green 2G Supra Disp.	496.00	
Red H 8B	169.45	Orange Brown H 28	209.05	Olive Green B Pdr. Fine	399.90	
Scarlet H RN	245.05	Brown M GRN	188.80	Olive D Pdr. Fine	444.30	
upra Red H-3BP	179.30	Black H-N	283.35	Olive Green B Supra Disp.	308.25	
Red H-F3B	243.45	SULFUR COLOURS		Per Kg.	Jade Green XBN Supra	
III. Magenta HB	167.00	Navy Blue	99.85		Disp. (N)	327.30
Red M 5B	98.90	Green G	198.55	Olive OMW Pdr. Fine	698.55	
Red M 8B	173.70	Black Grains Extra	63.05	Olive OMW Supra Disp.	538.05	
Pink MB	137.10	Black Grains OG	64.55	Olive R. Pdr. Fine	422.95	
III. Magenta MB	121.55	Black GXE Conc.	61.60	Olive D Supra Disp.	361.70	
Purple H-3R	180.20	Black GXE	52.75	Olive R Supra Disp.	363.90	
Brill. Purple H-7R	175.40	Black GXR	61.60	Olive D. Ptg. Paste	193.00	
Navy Blue H 3R	298.50	Black Grains 800	54.20	Olive Green B. Ptg. Paste	199.10	
Brill. Blue H-GR	366.55	Black EXR Grains	64.55	Olive Green B Acra Conc.	542.75	
Brill. Blue H 5G	173.10	Black EXR Grains 800	51.25	Olive R Acra Conc.	640.00	
Blue H 5R	283.85	VAT COLOURS (ICI)		Per Kg	Olive Green B Acra Conc.	542.75
Brill. Blue H 7G	178.70	Yellow 5G Powder Fine	673.15		Brown R Pdr. Fine	835.00
Brill. Blue H 7RX	358.15	Yellow 5G Supra Disperse	439.30	Brown G. Pdr. Fine	795.00	
Turquoise HA	234.45	Yellow 5G Acra Con.	628.75	Brown R Pdr. Fine	659.75	
Supra Blue H-3RP	335.70	Yellow 3R Powder	588.85	Dark Brown 3R Pdr. Fine	685.00	
Supra Turquoise H 2GF	181.50	Gold Orange 3G Pdr. Fine	952.15	Brown G. Supra Disp.	449.90	
Blue H-ERD	305.80	Brill. Orange 6R Pdr. Fine	624.35	Brown 2G Supra Disp.	554.00	
Navy Blue H ER	258.60	Gold Orange 3G Supra Disp.	601.30	Brown R Supra Disp.	422.95	
Blue H 5RX	269.30	Brill. Orange 6RX Powder	394.30	Brown BR Powder	719.00	
		Brill. Red 3B Pdr. Fine	997.80	Dark Brown 3R Ptg. Paste	217.15	
		Brill. Red 3B Supra Disp.	713.20	Dark Brown 3R Supra Disp.	414.55	
		Brill. Purple 4R Conc. Pdr.	470.75	Brown G Acra Conc.	733.95	
		Brill. Purple 3R Acra Powder	690.85	Brown R Acra Conc.	766.00	
		Brill. Purple 2R Hly Conc.	597.90	Grey M. Powder Fine	768.80	
		Brill. Purple 4R Supra Disp.	500.05	Grey M. Supra Disp.	585.45	
		Brill. Purple 2R Acra Conc.	625.95	Blue BC Acra Conc. Pdr. Fine	762.70	
		Blue R Powder Fine	542.15	Direct Black AC Supra Disp.	330.35	
		Blue BC Conc. Pdr. Fine	522.50	Direct Black AC Pdr. Fine	474.70	
		Blue BC Acra Conc. Pdr. Fine	762.70	Direct Black CH Supra Disp.	393.20	
				Direct ACD Ptg. Paste	217.15	

Bombay Drugs Market

(Prices as on 14th December, 1987)

Product	Rs. per kg.		
Acetazolamide IP	700.00	Ethambutol IP	650.00
Acriflavine BPC	800.00	Ferrous Fumarate	45.00
Aluminium Hydroxide IP	21.00	Folic Acid IP	5000.00
Ampicillin Trihydrate	2,000.00	Furosemide IP	1,210.00
Aspirin IP	72.00	Furazolidone IP	285.00
Barium Sulphate	19.90	Gentamycin Sulphate	9.20
Belladonna Extract	74.50	Gum Acacia	57.00
Benzoic Acid IP	31.40	Gum Acacia White	95.00
Caffeine Citrate IP	305.00	Gum Guar	26.00
Caffeine IP	1000.00	Hemastropine Methyl Bromide	9.25
Calcium Gluconate IP	35.00	Ibuprofen IP	460.00
Calcium Glycerophosphate	141.00	I.N.H.	215.00
Calcium Hypophosphate BPC	128.00	Inositol IP	560.00
Calcium Phentionate	450.00	Iodochloro	305.00
Calomel BP	330.00	Iodoform NF	540.00
Cetrimide IP	215.00	Lactose IP	31.00
Chloroquine Phosphate	530.00	Lactic Acid	68.00
Choline Chloride FG	33.00	Lignocaine HCL	255.00
Choline Chloride IP	65.00	Lignocaine Base	255.00
Citric Acid IP	42.00	L. Lysine Feed	135.00
CMC Sodium HV	85.00	L. Lysine Pharma	180.00
C. P. Maleate IP	905.00	Magnaldrate IP	51.00
Dapsone IP	320.00	Magnesium Carbonate IP	15.00
D. C. Citrate	300.00	Magnesium Hydroxide	20.50
Dexamethasone	75.00	Magnesium Hypophosphate	125.00
Diastase (1:50)	58.00	Magnesium Trisilicate IP	11.50
Diazepam IP	600.00	Mannitol USP	64.00
Di Iodo Hydrin	350.00	Mebendazole	620.00
Diloxanide Fumarate IP	400.00	Mercurochrome NF	285.00
Di Phenyl Hydrogen Citrate	198.00	Menthol	190.00
Di Sodium Hydrogen Citrate	43.00	Metronidazole IP	415.00
D-Panthenol Liquor	550.00	M.P.S.	142.00
Ergomatrine Maleate	165.00	Niacinamide	143.00
		Oil Mentha	80.00
		Oxyphenbutazone	565.00
		Papaïne BPC	51.00
		Paracetamol	110.00
		Pectine IP	233.00
		Pepsin 1:3000	450.00
		Pheniramine Maleate	700.00
		Phenyl Butazone USP	255.00
		Potato Starch	65.00
		Rifampicin IP	2,900.00
		Saccharine Sodium	225.00
		Salbutamol Sulfate	8.00
		Sodium Hydrophosphate	125.00
		Sodium Salicylate	70.00
		Sorbitol Powder	125.00
		Sorbitol USP	17.00
		Sulfacetamide	268.00
		Sulphamethoxazole	450.00
		Tinidazole	378.00
		Theophylline Ann	700.00
		Trimethoprim IP	920.00
		Vitamin A, Palmitate	2,650.00
		Vitamin B1 Hydrochloride	2,300.00
		Vitamin B1 Mononitrate	1,700.00
		Vitamin B2	2,500.00
		Vitamin B6 Hydrochloride	1,600.00
		Vitamin B12	135.00
		Vitamin B2 5-Phosphate	3,900.00
		Vitamin C Plain	258.00
		Vitamin C coated	268.00
		Vitamin K3 W/S	750.00
		Yeast Powder	24.00

We cannot guarantee the accuracy of the prices published in CHEMICAL WEEKLY as they are based only on the enquiries made by our correspondent — and, as such, they are not FIRM PRICES as between a buyer and a seller. The prices are published only with a view to giving some idea of market conditions.

Delhi Market

DELHI: DEC. 25 (NNS) — Titanium dioxide recorded a handsome gain of Rs. 4.50/7 per kg in the local chemicals market during the last week, due to tight supply, says NNS. Caustic soda solid and flakes, borax granular and crystal also hardened by Rs. 15/20 on reduced stocks, whereas tartaric acid suffered a fall of Rs. 50 in the absence of demand.

Titanium dioxide Anatase and RC-2 gained smartly by Rs. 4.50/7 kg. Borax granular and crystal advanced by Rs. 15 at Rs. 575 each per 50 kg. in the absence of arrivals along with the dwindling stock position. Caustic soda flake and solid improved from Rs. 375 and Rs. 385 to Rs. 395 and Rs. 400 thanks to good demand by consumers. Soda ash Birla and Tata held steady at Rs. 290 and NAL at Rs. 267, whereas soda ash PNFC drifted lower

by Rs. 3 at Rs. 255 due to slack off-take. Ammonia bicarb ruled quiet at Rs. 127 per 25 kg.

Menthol flake and bold hardened from Rs. 153 and Rs. 172 to Rs. 160 and Rs. 176 in the beginning of the week owing to sustained demand by stockists but at weekend it turned easy owing to fresh offerings of about 2 tonnes from the mandis of U.P. and finished at Rs. 158 and Rs. 175 thus showing a gain of Rs. 3/5. Sodium hydro sulphite Tamil Nadu moved up by Re. 1 at Rs. 31 on account of brisk buying by gur manufacturers. Dammosha and Kalali however ruled static at Rs. 34 and 36 respectively. Mercury ruled firm at Rs. 8800 per flask.

Tartaric acid suffered losses by Rs. 50 at Rs. 7,550 in the absence of off-take due to winter season. Paraffin wax eased by Rs. 5 at Rs. 575, Hydrogen peroxide by Re. 1 at Rs. 26, whereas naphthalene balls appreciated by Rs. 10 at Rs. 1060 on good demand.

No appreciable change was recorded in dyes and colours.

Formaldehyde (per kg.)	6.00
Hydrogen Peroxide (per kg)	26-30.00
Calcium Carbonate (per tonne)	2,500-4,000.00
Acid Slurry Soft (per kg.)	25.00
Acid Slurry Hard (per kg.)	32.00
Phosphoric Acid (per 50 kg.)	810.00
Pot. Nitrate (per quintal)	900-1,200.00
Pot. Permanganate (per 50 kg.)	2,300.00
Sod. Bichromate (per 50 kg.)	1,025-1,125.00
Tri-sod. Phosphate (per 50 kg.)	310-330.00
Titanium Dioxide Anatase (per kg)	56.00
Titanium RC-822 (per kg.)	68.00
Zinc Oxide (per metric tonne)	30,000-34,000.00
Phenol Carbolic Acid (per kg)	50.00
Carbon Tetrachloride (per kg.)	18.50
Chloroform (per kg.)	26.00
Sodium Sulphate (per 50 kg.)	160-185.00
Naphthalene Balls (per 50 kg)	1060.00

(DELHI MARKET RATES AS ON DECEMBER 25, 1987)

Ammonia Bicarb (per 25 kg)	127.00
Mercury (per flask)	8,800.00
Soda ash (per bag)	255-290.00
Ammonium Chloride (per 50 kg.)	110-180.00
Caustic Soda solid (per 50 kg)	400.00
Caustic Soda flakes (per 50 kg)	395.00
Citric acid (per 50 kg)	2,050-2,200.00
Stable Bleaching Powder Shriram (per 25 kg)	96.00
Stable Bleaching Powder KCI (per 25 kg)	85.00
Stable Bleaching Powder MODI (per 25 kg)	92.00
Sod. Bicarbonate (per 50 kg)	250-255.00
Sod. Hydro Sulphite (per kg)	31-36.00
Rangolite (per kg.)	39.50-60.00

Boric acid Technical (per 50 kg)	1000.00
Paraffin wax (per 50 kg)	575.00
Tartaric acid (per 50 kg)	7,550.00
Borax Granular (per 50 kg)	575.00
Borax Crystal (per 50 kg.)	575.00
Sodium Nitrite (per 50 kg)	650.00
Sodium Nitrate (per 50 kg)	380.00
Camphor Thal (per kg)	93.00
Camphor Powder (per kg.)	84.00
Menthol Bold (per kg)	175.00
Menthol flake (per kg)	158.00
Menthol medium (per kg)	168.00
Glycerine (per kg)	45-55.00
Sodium Silicate (per quintal)	250.00
Hexamine (per kg)	25.00
Acetic Acid Glacial (per kg.)	14.50-18.00
Copper Sulphate (per quintal)	1,900-2,200.00
Formic acid (per kg)	29.00

DYES & COLOUR Per Kg

Naphthol AS	150.00
Naphthol ASG	235.00
Naphthol ASBS	200.00
Naphthol ASTR	302.00
Naphthol ASOL	191.00
Naphthol ASBO	208.00

DIRECT DYES Per Kg

Black E. Conc.	92-155.00
Diazo Black B.T.	125.00
Green B.	115.00
Blue 2-B	86.00
Sky Blue FB	200.00
Basic Auramine 'O' Conc.	65-100.00
Basic Rhodamine B. 500%	220-300.00
Basic Methylene Blue	92-130.00
Basic Violet	142-160.00
Basic Malachite Green	160-185.00
Acid Orange	45-52.00

MATERIALS IMPORTED

BOMBAY

(From 18-12-87 to 23-12-87)

(Cost of Imported Item is
CIF Value)

ALUMINIUM OXIDE: From W. Germany: Peico Electronics and Electricals Ltd., NA kgs., Rs. 2,519.

BUTYLENE GLYCOL: From Japan: Indofil Chemicals Ltd., 16,000 kgs., Rs. 3,25,823.

CAPROLACTAM: From Netherlands: Jagatjit Cotton Text. Mills Ltd., New Delhi, 3,91,000 kgs., Rs. 73,10,110; From Spain: Modipan Ltd., U.P., 50,000 kgs., Rs. 1,02,11,588.

CYCLOHEXANONE: From Germany: The Atul Products Ltd., 10,800 kgs., Rs. 2,25,098.

DIETHYL THIOPHOSPHORYL CHLORIDE: From Denmark: Sandoz India Ltd., 16,425 kgs., Rs. 6,88,419; 16,425 kgs., Rs. 6,88,419.

GLYCERINE: From Malaysia: Hardcastle & Waud Mfg. Co. Ltd., Thane, 5,000 kgs., Rs. 93,609.

HIGH DENSITY POLYETHYLENE: From Czechoslovakia: Associated Brothers, 12,500 kgs., Rs. 87,500.

HIGH DENSITY POLYETHYLENE: From Saudi Arabia: Prakash Plastic Inds., 17,150 kgs., Rs. 1,50,575.

HYDROGEN PEROXIDE: From Taiwan: ABS Plastic Ltd., Baroda, 16,000 kgs., Rs. 3,09,877.

HYDROXYLAMINE SULPHATE: From Japan: A.P.T. Amalgamation Ltd., 17,500 kgs., Rs. 4,50,712.

HYDROXY PROPYL ACRYLAMIDE: From Germany: Aquapharm Chemicals Ltd., Pune, 2,000 kg., Rs. 1,01,465.

ISOTOPE OF IODINE: From USA: Ezra Bros., 35 kgs., Rs. 45,372.

LOW DENSITY POLYETHYLENE: From West Germany: M. Talequip Enterprises, 98 kgs., Rs. 4,11,788.

MERCAPTO ETHANOL: From Germany: Aquapharm Chemicals Ltd., Pune, 1,000 kgs., Rs. 49,930.

METHOXY ACRYLAMIDE: From Japan: The Atul Products Ltd., 1,050 kgs., Rs. 2,82,730.

NALIDIXIC ACID: From U. Win Medicare Pvt. Ltd., 500 kg., Rs. 4,27,243.

NAPHTHENIC ACID (DISTILLED): From Belgium: Aman Enterprises, Bulsar, 3,040 kgs., Rs. 47,196.

NONYL PHENOL: From Japan: Dai Ichi Karkaria Pvt. Ltd., 15,000 kgs., Rs. 1,93,221.

OCTADECYL ETHYLENE UREA: From Japan: Valia Chemicals P. Ltd., 1,000 kgs., Rs. 41,594.

PHOSPHATE: From UK: Colgate Palmolive (I) Ltd., 28,700 kgs., Rs. 3,65,267; 8,100 kg., Rs. 1,02,910.

PIVALOYL CHLORIDE: From France: Tini Pharma P. Ltd., Hyderabad, 2,160 kgs., Rs. 1,46,630.

POLYSORBATE 30 USP: From Canada: Glindia Ltd., 15,800 kgs., Rs. 2,99,326.

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Phones : 2970/2841

LYVINYL ALCOHOL: From
Vareli Textile Ltd., 3,000
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ICATES: From West Germ-
Kirloskar Pneumatic Co.
Pune, Rs. 52,895.

ICON DIOXIDE: From Hol-
Peico Electronics and Elec-
s Ltd., 40 kgs., Rs. 5,710.

IOUREA: From Japan: Su-
nan Chemicals Ltd., 1,000
Rs. 19,367.

TANIUM DIOXIDE: From
n: Shah Trading Co., 5,000
Rs. 1,26,533, 5,000 kgs.,
1,26,533; 5,000 kgs., Rs.
533; From Japan: Tata Ex-
s Ltd., 17,500 kgs., Rs.
9,119.

TANIUM DIOXIDE RUTILE :
n West Germany: Asian Pain-
Ltd., 60,000 kgs., Rs.
38,121.

TANIUM MONOXIDE: From
st Germany: Bright Engg. Co.,
kgs., Rs. 14,867.

TUNG OIL: From China: Bake-
Hylam Ltd., 20,000 kgs., Rs.
2,25,020.

Materials Exported BOMBAY

(From 18-12-87 to 23-12-87)
(Cost of Imported Item is
CIF Value)

AMMONIUM BICARBONATE:
Port Said: Rashtriya Chemi-
ls & Fertilizers Ltd., 50,000
s., Rs. 63,266.

DI CALCIUM PHOSPHATE: To
rtleton: G. Amphrey Labs.,
00,000 kgs., Rs. 2,65,915.

POTASSIUM IODIDE BP 80 :
o Lyttleton: G. Amphrey Labs.,
00 kgs., Rs. 54,261.

POTASSIUM NITRATE: To
eddah: Nathubhai Cooverji &
Co., 5,000 kgs., Rs. 67,700.

DRUGS. MATERIALS IMPORTED

BOMBAY
(From 18-12-87 to 23-12-87)
(Cost of Imported Item is
CIF Value)

AYURVEDIC MEDICINES: To
Singapore: Maxo Labs. P. Ltd.,
75 kgs., Rs. 3,443.

BENZHEXOL TABLETS: To
Colombo: Bombay Drug House
Pvt. Ltd., 532 kgs., Rs. 25,300.

CHLORAMPHENICOL: To Co-
lombo: Bombay Drug House P.
Ltd., 125 kgs., Rs. 14,300.

**CHLOROQUINE PHOSPHATE
TABLETS:** To Colombo: Bombay
Drug House P. Ltd., 15,200 kgs.,
Rs. 3,900.

CARBAMAZEPINE TABLET:
To Colombo: Bombay Drug Hou-

se P. Ltd., 36 kgs., Rs. 56,800.

CLIOQUINOL CREAM BP: To
Colombo: Bombay Drug House
P. Ltd., 11.5 kgs., Rs. 14,250.

DRUGS: To Colombo: Bombay
Drug House P. Ltd., 43.5 kgs.,
Rs. 21,800.

HARMLESS MEDICINES: To
Colombo: Inga Labs. P. Ltd., 125
kgs., Rs. 32,000.

**NYSTATIN OINTMENT BPC/
USP:** To Colombo: Bombay Drug
House P. Ltd., 30 kgs., Rs. 8,400.

**PHENYL BUTAZONE SODIUM
INJ:** To Colombo: Sarabhai Intl.
Ltd., Baroda, 36.9 kgs., Rs.
11,55.

WESTERN DRUGS: To Colom-
bo: Bombay Drug House P. Ltd.,
81 kgs., Rs. 20,800.



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UK chemicals growth strong

UK chemicals output is growing strongly and product prices are rising, according to the UK's Chemical Industries Association (CIA). Home sales continue to strengthen and exports have revived, allowing capacity utilization to remain high.

At the same time imports are rising sharply. Nevertheless, interim profits reflect improved trading and short-term economic and chemical industry prospects remain favourable. These are the main conclusions of the CIA's autumn report.

Over the first half of the year, world chemicals output increased by around 4 per cent on the same period in 1986 with production in the US and Japan continuing to grow more rapidly than in the majority of European countries except the UK and Netherlands. Output in Western Europe has been depressed by sluggish performance in West Germany, where chemical output declined during the first half year after a poor start, but has since resumed a more encouraging trend.

Despite this, basic chemicals production in Europe, according to the Cefic index, was 4.5 per cent up over the first seven months of 1987 with plastics up 6.5 per cent and organics up 5.5 per cent. Both were far more buoyant than inorganics, which rose only 2 per cent.

UK chemicals output grew 7.5 per cent in the first seven months with particularly large increases for dyestuffs/pigments, organics and soap and toiletries. Comment from member companies indicates strong demand across most of the industry with high levels of output being sustained throughout the summer, the CIA says. Fertilizers is the

one major area where performance is still unsatisfactory.

Generally, producers are operating chemical plants close to capacity ceilings, leaving shortages and pulling in imports.

In recent months the UK chemical industry has benefited from a period of greater stability in sterling — particularly against the DM, although present currency levels are less favourable than at the beginning of the year. After rapid growth at the end of 1986, exports fell back during the first two quarters of 1987, but have since recovered so that over the first 8 months as a whole export volume was almost 6 per cent above the same period last year.

By comparison, imports increased by around 10 per cent with a particularly sharp increase during the summer, associated with high levels of demand. The trade surplus for chemical products fell to £1,360m (\$2,240m) after 8 months compared with £1,506m at the same stage last year. When looking at the changes in the sterling value of chemical exports between the first half of 1986 and 1987 the deficit with the EEC rose.

There were large percentage increases in the value of chemical exports to Japan and Latin America and significant falls to North America and the Middle East/North Africa. The growth in trade to Western Europe was modest.

Despite tensions in the Gulf, oil prices have eased somewhat since July and this has also been reflected in feedstock prices. In general product prices continue to be underpinned by firm demand, the CIA says.

In August, the price index of raw materials and fuels purchas-

ed by the UK chemical industry was 12.3 per cent up on the month last year. Over the period, output prices had risen by 6.4 per cent. With regard to other cost pressures, the index of average employee earnings continues to rise at above 3 per cent per year, but with wages remaining at 335,000 and output rising strongly, there is little inflationary push from rising unit labour costs. Undoubtedly this will become more critical when the rate of output expansion slows, the CIA believes.

The major current problem for the industry is the high and discriminatory pricing by the UK Government of gas to its industrial customers, it says.

Another problem area, in which the CIA has been actively seeking to influence the Government, is the 1990 VAT changes and the proposed changes. These could more than double the rates burden for sites and increase the overall industry rates bill by some 10 per cent — seriously damaging national competitiveness — unless specific proposals developed by the CIA to minimize increases are accepted.

New direct capital spending by the industry in the UK was £660m during the first half of the year representing a 10 per cent increase in "real" constant price terms on the same period in 1986. Fears of a recession have faded. In the short term, the consensus appears to be that the US and world economies will continue to grow through for another year. The new US administration is expected to take more positive steps to solve deficit problems, which at present could trigger the next rec-

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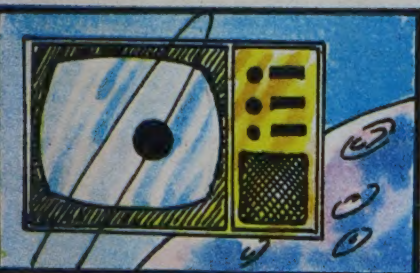
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